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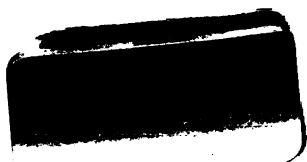
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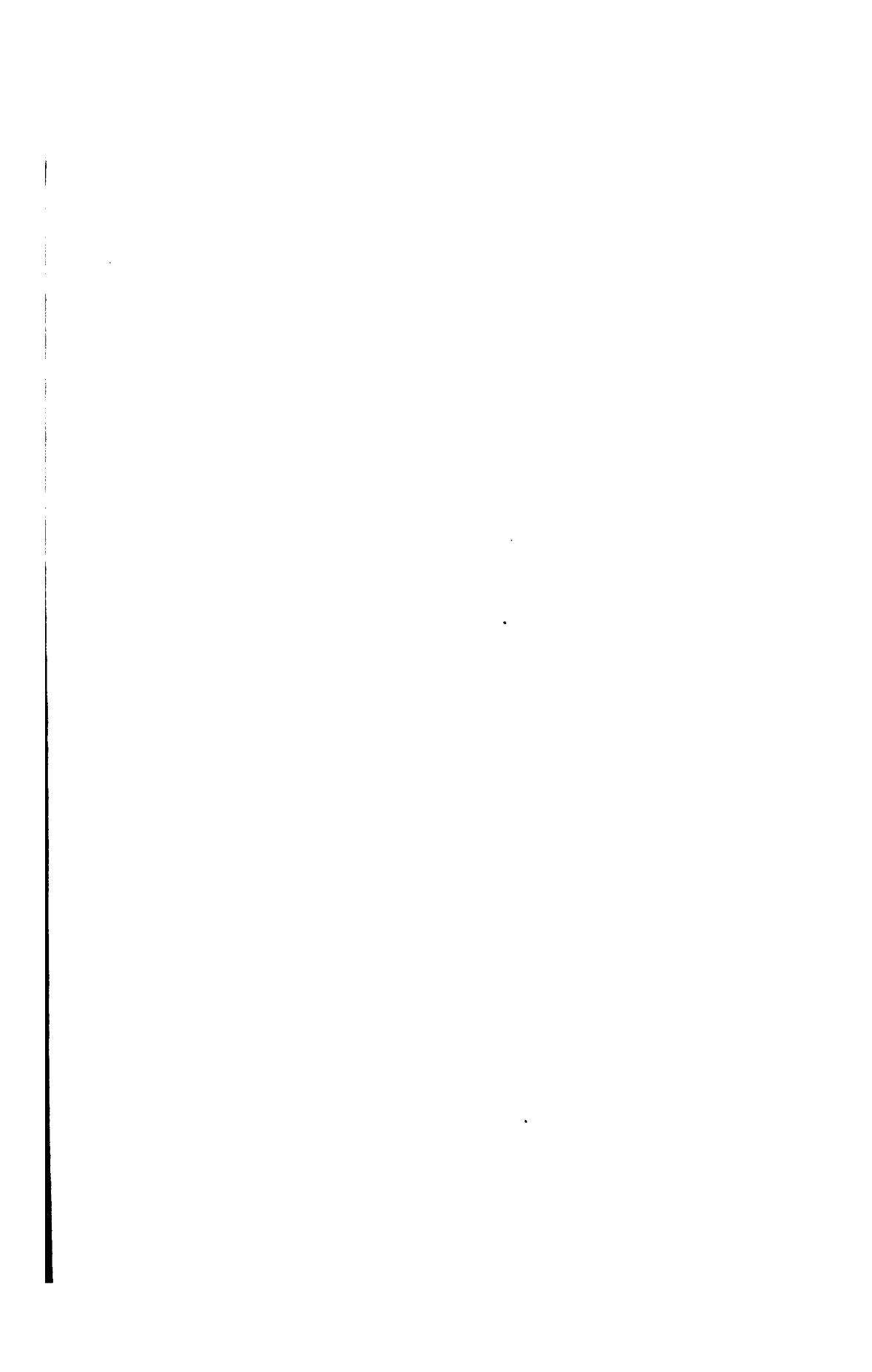
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STATE OF NEW YORK

ANNUAL REPORT

COMPLIMENTS OF

Frank M. Williams

State Engineer and Surveyor.

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STATE OF NEW YORK

ANNUAL REPORT

OF THE

State Engineer and Surveyor

For the Year Ended June 30, 1918

VOL. I



ALBANY
J. B. LYON COMPANY, PRINTERS
1919

10

STATE OF NEW YORK

OFFICE OF THE STATE ENGINEER AND SURVEYOR

ALBANY, N. Y., *January 8, 1919*

To the Legislature:

I beg to transmit herewith the State Engineer and Surveyor's annual report for the year 1918.

Respectfully,

FRANK M. WILLIAMS,

State Engineer and Surveyor.

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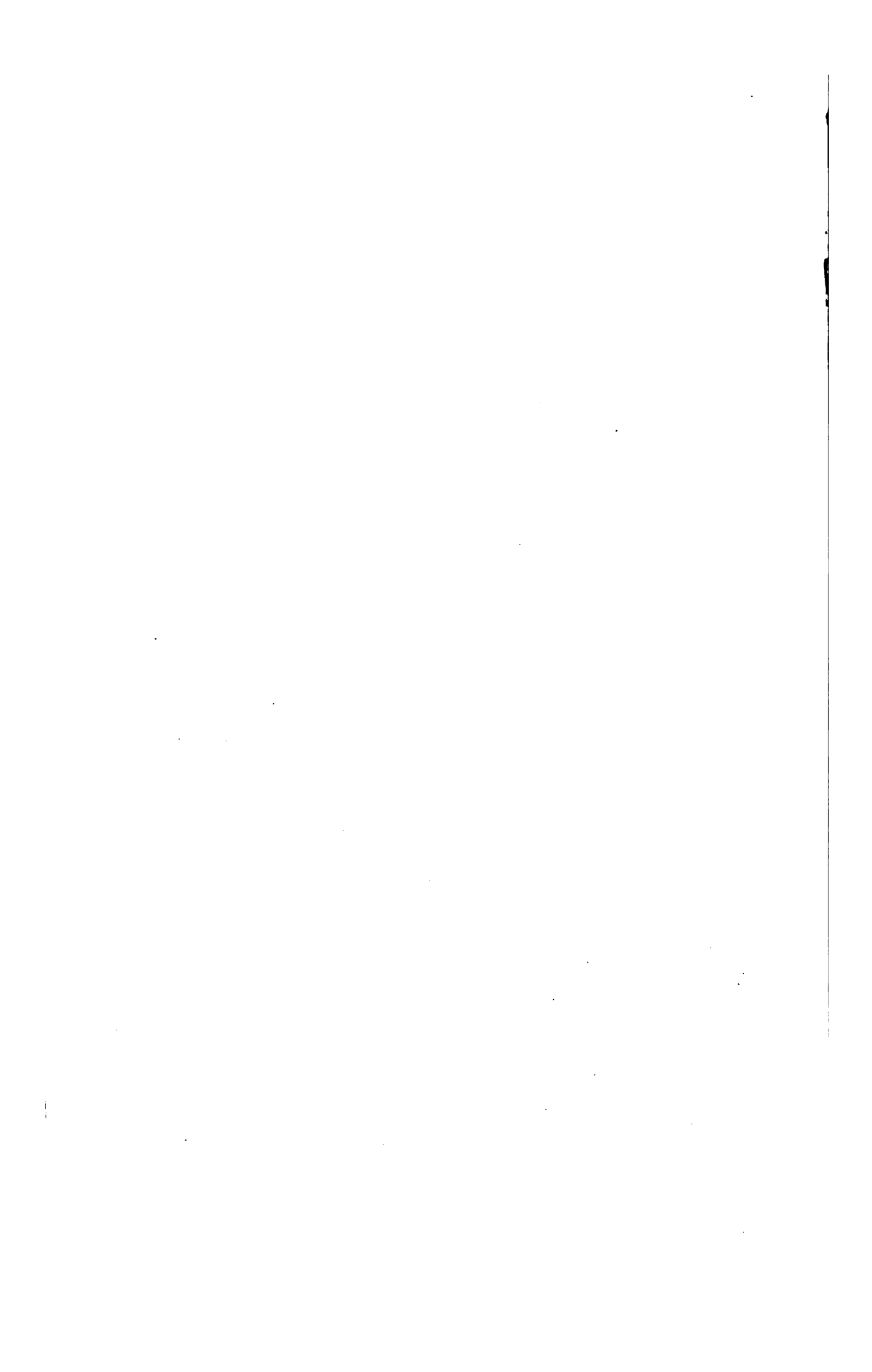


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The report of the Gaging of Streams for 1918 is published as a supplemental volume, or Vol. II.

REPORT

The following report to the Legislature covers an account of such of the activities of myself and my Department as is customary to include in the annual reports of the State Engineer, with the addition of the military list of the Department. The State Engineer is a member of four constitutional boards, namely, the Canal Board, the Land Board, the State Board of Canvassers and the Board of Equalization of Assessments, and also of the River Regulating Section of the Conservation Commission. There are various other boards and commissions that are created from time to time for specific purposes, of which he is a member and during the past two years the number of these has been unusually large. These special boards and commissions during 1918 have been the following: State Council of Defense, Hospital Development Commission, Jamaica Bay-Peconic Bay Canal Board, Acquisition of Land for Public Defense at Rockaway, Committee to Investigate the Water-Powers of the State, Interstate Bridge Commission, and Commission to Investigate Canal between Tonawanda and Buffalo.

The work which has taken the greater part of the State Engineer's attention for several years is the construction of the Barge canal and its terminals. In addition there are usually many pieces of public work of various kinds which are built under the supervision of the State Engineer, as well as numerous surveys and investigations which he is authorized and directed to make. Also there are only a few of the several State departments and commissions which have engineering forces of their own and such engineering work as comes under the jurisdiction of those which have none is generally done by the State Engineer. The State, represented by the State Engineer, coöperates with the Federal Government through the Geological Survey in topographic and hydrographic work throughout the state. It is this work of build-

ing the Barge canal and its terminals, of supervising these smaller pieces of public work, of making surveys and investigations, both as directed by special legislative acts and at the request of other State departments, and of coöperating with the Federal Survey, that forms the subject matter of my annual report.

In my general discussion of what has been done I shall include the work of the calendar year 1918. The amounts reported as expended for construction and engineering are those for the fiscal year ended June 30, 1918.

BARGE CANAL

COMPLETION FOR OPENING MAY 15, 1918

In my report of a year ago I promised that the new canal would be opened to navigation throughout its entire length on May 15, 1918, and that it at that time would have been constructed to its full depth of 12 feet. That promise was fulfilled, even in spite of the fact that more numerous and greater difficulties arose to defeat the accomplishment than were anticipated when the promise was made. In order that the canal might to the fullest possible extent relieve an unprecedented traffic congestion and also might contribute its share toward solving the all-important transportation problem at a time when the destinies of the nation and of the world hung in the balance, it seemed imperative that the whole new channel should be opened to navigation for the season of 1918. This achievement tried the temper of the State Engineer's Department on a scale and to a degree that it has probably never been tried before, but the engineers and the contractors also were glad to contribute the necessary effort and anxiety to accomplish the desired result.

Most of the difficulties were due to war conditions. The cost of both labor and materials had increased enormously and these essentials were hard or even impossible to get at any price. Transportation routes were congested almost to a standstill. Shipments of material were sometimes lost or were commandeered en route for Government activities. Numerous embargoes against shipments were in force. The necessity of obtaining priority orders involved vexatious delays and moreover canal work never was

given a class "A" priority rating. There was an acute coal shortage. Men engaged on canal contracts were frequently taken for army service or drawn into shipyards or munition plants. As an instance of this practice — on the railroad bridge at Brewerton three full gangs of erectors were lost one after another within a period of five weeks, and the erection of this bridge had been begun only six weeks before May 15, and if it could not be erected, navigation would be blocked. Much the same thing occurred at the Pittsford railroad bridge. In addition to all hindrances of this character, which were attributable chiefly to the war, the winter of 1917-18 brought more severe weather conditions than had been experienced before in many years.

Several expedients were employed to attain the desired end and thus be able to open the canal at the appointed time. Early in the spring it became evident that the Pennsylvania Railroad Company, because of war conditions in the steel market, could not obtain steel for its crossing of the Barge canal just west of the Genesee river. For a time it seemed as if this failure would frustrate the whole scheme of opening the canal. However, an arrangement was made for diverting the entire traffic of this road, first to the Erie railroad, then to the West Shore railroad and then back to the original line. Thus the Pennsylvania embankment could be cut and this was done just in time to let the water through for the day of opening. At Tonawanda a temporary bridge was built so as to permit the passage of boats, pending the construction of a new bascule bridge. A temporary wooden dam across the Genesee river was an expedient without which the new canal in the vicinity of Rochester could not have been opened for the season of 1918. The necessity of this temporary dam was perceived in the summer of 1917 and proper provision had been made for its construction. At a few localities and for short distances only, a channel of only 50 feet wide was excavated prior to May 15. However, the full depth of 12 feet was obtained at these places, thus making the canal prism of sufficient size to accommodate boats of full Barge canal dimensions.

The work needed to prepare the canal for opening was distributed throughout several sections, chiefly in the western part of

the state. In the vicinity of Lyons it became evident in the spring of 1917 that the contractor was not progressing rapidly enough to insure the completion of his portion of canal in time for the navigation season of 1918. Dependent on the completion of this section was another necessary piece of work — the removal of the Montezuma aqueduct, the structure which carried the old canal across the Seneca river and which had to be removed to make way for the Barge canal channel in the bed of the river. If the aqueduct had been removed and the Lyons section had not been completed, then there could have been no navigation, either by the old or by the new canal. To guard against such uncertainty the Canal Board suspended the contract and directed the Superintendent of Public Works to complete the work with State forces. Then a contract for removing the aqueduct was awarded and the structure was removed in time to permit navigation to pass through the river channel.

A similar course of suspension of contract was adopted on the work involved in the Irondequoit valley crossing, but not until March, 1918, when it became evident that such action was necessary. This is the place where the canal is carried through a great concrete trough, built on a high embankment. There was also considerable channel excavation to be done under this same contract. By assembling men and machinery from every possible source the Superintendent of Public Works was able so to hasten operations here that the canal could be opened on time.

In the vicinity of Tonawanda there was so much to do that the work had to be pushed with utmost vigor. Moreover, difficulties were encountered at Pendleton and at Sulphur Springs. The contract for work through Tonawanda could not be awarded until late in 1917, for the old channel in Tonawanda creek was maintained by a dam which had to be removed in carrying out Barge canal plans, and as soon as this should be taken out navigation in the old canal was cut off and several railroad and highway bridges required rebuilding or underpinning. To meet these coördinated requirements demanded swift and well-planned action. Work in this vicinity was apparently progressing satisfactorily until within ten days before the day set for opening. Then a bad slide occurred in the canal channel located in Tonawanda creek. It seemed for a



FLEET OF BOATS PASSING THE BARGE CANAL TERMINAL AT FONDA
These are boats which have been used on the old canal. A fleet of this size, consisting of six boats and a tug, can be passed by one of the new locks at one lockage.

5

time that a delayed opening was inevitable, but by most energetic efforts a hydraulic dredge was transferred to this point within twenty-four hours and by May 15 the channel had been cleared.

The greater part of what remained to be done a year ago was situated in the vicinity of Rochester. It was known that it would be absolutely impossible to complete the whole of this work by the spring of 1918, but fortunately much of it was located on the spur forming the harbor of Rochester and situated between Rochester and the main line of the canal. By building a temporary dam across the Genesee river and by constructing a junction lock at South Greece and utilizing the old canal between this lock and Rochester, provision was made for through traffic on the main line, which would be a channel of Barge canal dimensions and which passes through the southern border of the city, and for local Rochester traffic by way of the old canal channel. But even to carry out this program a large amount of work was necessary and only by unflagging zeal and persistent effort was success achieved. The rock cut west of the Genesee river was pushed to completion by the contractor. The contractor working on the Rochester harbor contract was ordered to transfer his excavating machines to the main line of the canal. On May 1 it looked as if the junction lock at South Greece could not be completed in time, but by supplying the contractor with men and teams from among those collected for the Irondequoit work delay was averted. The guard-lock east of the Genesee was not ready until the time for opening had almost arrived and it required the extreme limit of effort by night as well as day to get it ready.

A modest ceremony accompanied the last stages of preparing the canal for opening. The canal crosses the Genesee in a pool created by building a dam across the river below. In order to facilitate operations, most of the canal channel on each side of the crossing was dug as dry excavation, a narrow dike being left at each river bank. On May 10, I had the honor of removing the last barrier to a continuous new channel across the state — a channel which reunites the ocean and the inland seas by means of a great modern canal, which, I trust, will repeat the history of its predecessor and will bring added prosperity to both our State and our Nation. Gathered on the western bank of the Genesee was a

small company composed of members of the engineering staff and a few prominent citizens. With a laborer's shovel I opened a small ditch across the intervening dike, letting the waters of the river through to the new channel. Then a drag line excavator enlarged the ditch till the canal channel had been filled and the connection was made. A half hour earlier the dike at the east river bank had been similarly cut. When the canal was opened to traffic on May 15, the event was unaccompanied by ceremony or ostentation of any kind, except that about a hundred engineers and contractors, who had been engaged on the Western division of the canal, assembled in the evening at a hotel in Rochester for an informal dinner in celebration of the event.

WORK REMAINING AFTER CANAL OPENING

After opening the canal to navigation, the largest piece of construction work remaining to be done was that in the Rochester harbor. As I have stated, the expedient of building a temporary dam across the Genesee was adopted. By this means the canal could cross the river and traffic could go on without interruption and at the same time the river would be left free for building the spur to Rochester and completing the harbor and the rather complex adjacent construction. Another work to be done was the widening of the channel at the places where partial widths had been made to suffice for the initial opening. There were many other small pieces of work which were of such a character that they could be done without interfering with navigation. These consisted of completing the removal of the Montezuma aqueduct, building a few bridges and power-plants, removing washed-in material, laying wash wall, cutting off projecting points and other miscellaneous work. In terminal construction there remained much to be done, but of this work I shall speak under a separate heading.

FEDERAL CONTROL OF THE BARGE CANAL

Under the authority conferred upon the President of the United States to take over and operate canals and their floating equipment, and in accordance with the Federal plan to assume control of the transportation media of the country, the United States Rail-



STATE ENGINEER REMOVING THE LAST BARGE CANAL BARRIER

On May 10, 1918, the State Engineer dug a ditch through this dike on the west bank of the Genesee river — the last barrier to through navigation across the state. A half hour earlier he had cut through a similar dike on the east bank.

road Administration included the Barge canal as one branch of this great general system.

In 1917 the Canal Board, through the Governor, called the attention of the United States Government to the fact that the canal would soon be completed and that, if full advantage was to be taken of it, it must be equipped with boats. Subsequently, various State officials, canal organizations and individuals brought the subject before such of the Federal Departments, War Boards and army officials as had to do with transportation matters. Various plans were submitted to the Government by individuals covering the granting of financial assistance on the part of the Government to private canal transportation companies, which it was planned to organize. Similar requests for financial assistance were made to the Canal Board, which, of course, had no authority to act in the matter.

On January 31, 1918, I appeared personally before the United States Senate Committee on Commerce, in the course of its investigation of matters connected with the building of merchant vessels under the direction of the United States Shipping Board Emergency Fleet Corporation, and there I pointed out that the Barge canal would be opened the following spring; that as to its value as a military asset, it was not in the province of the State officials to judge; that here was a transportation system lying directly on the west and east line of traffic, and, if it should prove that this canal might have been utilized as a military adjunct and was not so utilized, the responsibility must rest on those Governmental authorities having the question of transportation in hand, whose attention had been called to it.

I pointed out, further, that while a waterway would be ready, floating equipment would be sadly lacking, because the increased prices of labor and materials made it prohibitive for private enterprise to construct boats, and that it was doubtful if boat-building materials could be obtained by private enterprise at any price. It therefore became the duty of the Federal Government, if the canal was to be utilized, to provide the floating equipment or to assist by some method in providing it.

In thus formally calling the attention of the Government to the existence of the canal and the possibilities of its use, I stated that

the State of New York had nothing to gain, nor had any of its officials, but that we considered it our patriotic duty to do our utmost to open the canal and make it serve the purpose of the hour to the fullest possible extent and to call the attention of the Government to it.

As a result, the Federal authorities investigated the canal and finally assumed control of it in a somewhat limited manner. I need not remind you that according to our State Constitution the canals must remain forever the property of the State. The State has always maintained and operated them and during Government control it has continued to do this, the same as heretofore. Unlike its administration of the railroads the Federal Government was not called upon to assume certain financial obligations in connection with the canal. It did not have to guarantee the payment of dividends nor provide for the upkeep of the property, nor in fact did it have to assume any obligation whatsoever connected directly with the canal itself. What it did was to take over control, either directly or indirectly, of the floating equipment on the canal. Its position was nearly analogous to that of a large transportation company which builds and operates boats on a State-owned canal. It obtained control of a large proportion of the boats which had been in use on the canal during recent years, although the whole number of such available craft is not large, and it built a few new boats, which were just beginning to be delivered when the navigation season ended. However, the Government became more than a mere transportation company; it stood ready to control all shipping on the canal, assuming the right under authority of Congress to commandeer any and all boats doing business on the waterway and even to direct the activities of those it did not commandeer. In fact for some time the impression was general among the independent boatmen that the Government would not permit them to operate on the canal. Of course the Government had no authority to grant or withhold permission to float a boat on the canal. Such authority rested solely in the Superintendent of Public Works of the State and could only be exercised by him. However, the Government could fix canal rates and it proceeded to do so. Much criticism has been aroused by this fixing of an arbitrary rate for interstate traffic approximately 20 per cent less



SHIPYARD FOR THE CONSTRUCTION OF GOVERNMENT CONCRETE CANAL-BOATS

Located near lock No. 7, at Fort Edward. The boats built here were some of those constructed by the Federal Government as a war measure during its control of the Barge canal.

than the railroad rate. It is claimed that this is not based on operating expense and that the differential in favor of the canal would be much greater if the rates could adjust themselves as they had heretofore. The fleet of boats operated by the Government was entirely inadequate, both in number and dimensions, to test the canal's capacity. The new boats which were ordered built were not delivered in time. It is apparent that if the canal is to serve an enlarged purpose next year it must be furnished with a largely increased number of new boats and that either freight must be diverted to it artificially or the present canal rate must be materially reduced or permitted to seek its own level by the introduction and operation of independent canal transportation companies.

USE OF THE CANAL

The navigation season which has recently closed — the first season of navigation throughout the whole extent of the improved canal — has been, so far as this department is concerned, very satisfactory.

The engineering structures have served the purposes for which they have been built in a highly creditable manner. There have been no failures on the part of the locks, dams, guard-gates and the multitude of minor structures which form a part of this canal. Many such structures were thrown into service for the first time last spring, including the new concrete trough at Irondequoit and the locks and heavy embankments in that vicinity and between that point and the Genesee river.

One section after another of the Barge canal has been thrown open to traffic in succeeding springs. The feeling of suspense on the part of the engineering organization, which must always accompany the first try-out of new structures, has been coupled with a growing confidence, as these structures, one after another, met the demands made upon them and justified the work of the designer and the builder.

It is not my province to report to you in detail concerning the traffic of the season, but I desire to state a few facts concerning the nature of this traffic.

That the canal has been remarkably successful in handling the traffic at certain localities is attested by the crowded condition of the terminal warehouses at those places throughout most of the season. At some of these terminals it has been necessary to build additional warehouses. It was not an unusual occurrence for these houses to be filled with freight.

Some cities, which had not heretofore been accustomed to ship much material by canal, developed into considerable waterway users. There are certain commodities, also, which are new on the list of canal freights or which have not appeared on that list for some years. Among these are gasoline, kerosene and other oils, molasses, coffee, copper, and electrical machinery, apparatus and supplies. Flour, too, was shipped in considerable quantity for the first time in many years. In general a much higher class of freight was carried than in former years, the total valuation being nearly 50 per cent over that of 1917.

In certain localities the shipment of war supplies was in part responsible for new traffic development and also for the addition of some unusual commodities. At Amsterdam and Utica, for example, war orders of knit goods were shipped by water. The canal had an opportunity to demonstrate that its usefulness is not confined to the carrying of low grade freights. It demonstrated that it is adapted to the carrying of package freights as well. Moreover, a large number of various kinds of craft, built at inland shipyards under Government war orders, utilized the Barge canal to reach the seaboard.

The canal was handicapped during the season by much misinformation regarding its condition and possibilities for use, which was spread broadcast, perhaps without malicious intent, but generally without any basis in fact. That the Barge canal should be completed to a point which permitted its full utilization seemed beyond the belief of many who had noted the long years during which it had been under construction. Entirely new navigation conditions aroused the timidity of the man accustomed to navigation on a shallow restricted channel. His fears or ignorance often gave rise to false stories of conditions. The mere fact, however, that there has been brought through the entire line of the canal boats having a width of not less than 30 feet and drawing $9\frac{1}{2}$ feet



A GOVERNMENT CONCRETE BOAT IN THE CANALIZED HUDSON RIVER
This is one of the boats built at Fort Edward which has just left the shipyard.

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of water, as shown by the records of the office of the Superintendent of Public Works, should indicate that the canal is, as claimed, in a condition to accommodate the size of floating equipment for which it was designed and constructed.

It is reported that the grain shipments were three and a half times those of the preceding year, but notwithstanding this increase, at the close of navigation there was lying in the Buffalo harbor, awaiting shipment, twenty times as much grain as had been carried on the canal during the whole season.

There have been a few large corporations that have put their own boats on the canal. These boats either have been built for the purpose or have been remodeled old craft. Among these industrial establishments are the General Electric Company, the Standard Oil Company, the Ore Carrying Corporation and the Valvoline Oil Company.

Within the last year or two an appreciation of the value of waterways and a realization of the need of an adequate national waterway policy have been increasing rapidly throughout the country. Possibly the war may have had its influence in this direction. The annual report of the Interstate Commerce Commission, recently submitted to Congress, recommends the development and encouragement of inland waterways and the coördination of rail and waterway transportation, a policy early recommended by the Barge Canal Terminal Commission of this State and lately put into effect by legislative act. Renewed interest is evident in advocating the Lake Erie and Ohio River and the Lake Erie and Lake Michigan canal projects. The Barge canal occupies the most strategic waterway location in the country. It is the direct and logical route between the Middle West and the Atlantic ocean. It is the shortest and cheapest water route between the Great Western grain belt and European markets. It is the connecting link between two great waterway chains.

This Department, in company with canal advocates in general, has been endeavoring for years to tell the people of the State the advantages of shipping by canal. But still one of the great needs of the canal at the present time is publicity — a campaign of education.

WORK AT RAILROAD CROSSINGS

During 1918 the few remaining railroad crossings have been so nearly completed that very little now remains to be done. There were eleven of these crossings on which work was in progress during the year. One was at Schenectady, one at Brewerton, one at Lyons, two near Rochester, two at Tonawanda, one at Cayuga, one near Seneca Falls and two near Geneva. Construction has been carried on without interfering with canal transportation, although, as I have previously stated, certain expedients had to be adopted to make it possible for both canal and railroad traffic to continue without interruption.

CANAL MAINTENANCE

Again I call your attention to the fact that construction funds should not be drawn upon to pay for certain work on the new canal that in reality is chargeable to maintenance. Such diversion of construction funds was never contemplated in the original estimate and is manifestly unjust. Provisions should be made from year to year for this work in the maintenance appropriation, and moreover, it should be realized that it will cost much more to maintain the new canal than it did to maintain the old. Moreover, much of the equipment employed in the maintenance of the old canal is entirely unsuited and inadequate for the maintenance of the new one. Aside from the fact that the Barge canal has been constructed on a much larger scale than was the old canal, the underlying theory of construction is entirely different as between the two. The old canal was essentially an artificial channel, retained partially by a series of embankments. The Barge canal for the greater part of its length is, on the other hand, an adaptation of natural watercourses by their enlargement and regulation to navigation purposes. While the work of maintaining the old canal consisted largely of guarding and repairing the embankments, the work of maintaining the new canal will consist principally of dredging and bank protection against wash, both natural and artificial, together with the maintenance of structures of enormous size as compared with those on the old



MAIN DRIVE BRIDGE, GENESEE VALLEY PARK, ROCHESTER
This bridge spans the canal. In design it is a counterbalanced steel cantilever bridge, with concrete floor and balustrades and asphalt roadway.

canal, and so located that their foundations instead of being susceptible of approach in the dry are to be found in submarine locations. The department charged with maintenance of the Barge canal should be equipped with the most improved type of floating excavating machinery of a size commensurable with the work which it will be called upon to do. It is proper that the Legislature should meet this situation. I recommend that necessary appropriations for adequate equipment be made.

Considerable time has been spent by the forces of this Department in assisting in maintaining a clear channel within the canal. In maintaining the canals there will always be engineering work to be done. There will be new construction to be planned and supervised, repairs to be planned for old construction, a base line to be maintained and property lines, channel obstructions and buoys to be referenced to it, surveys and estimates to be made and numerous other engineering operations of like character. In past years provision has been made for such work by an appropriation entitled, "Ordinary Repairs to Canals." An appropriation of this kind should be made this year, but it should be much larger than heretofore, somewhat in proportion to the differences in size of the two canals. As construction work is finished it is planned to retain part of the engineering force on maintenance work. Probably this can be done on the Eastern and Middle divisions during the present year and on the Western division next year. I recommend that sufficient appropriation be made to carry this maintenance organization for the Eastern and Middle Divisions of the canals for the next fiscal year.

FEDERAL CONNECTIONS AT CANAL TERMINI

At the main termini of the Barge canal, Federal waters are encountered. To render the canal fully efficient adequate connecting channels and the necessary harbor works must be provided, and to accomplish this the Federal Government must complete its work at certain of these termini. These Federal waters are at Waterford, Whitehall, Oswego and Tonawanda. For some of these adjoining projects Federal surveys have been made and Federal appropriations provided. One of the most important of

these projects is the deepening of the Hudson, the accomplishment of which would bring the Barge canal in touch with ocean-going traffic one hundred and fifty miles nearer than is now possible. In view of the considerable sum spent by New York State in constructing its new canal, and in view also of the immediate need for proper outlets, the expenditure required for these adjoining works should be contributed by the Government without delay. Therefore, I review my recommendation that "your honorable body by proper legislative action communicate with the Federal authorities urging this necessity."

USE OF SURPLUS WATERS

During the whole of my terms of office as State Engineer I have been in hearty accord with the general principles of conservation of natural resources and especially with that important phase of the subject which involves the conservation of water-power. I quote from my report to you of 1917:

"We are today having called to our attention more forcibly than ever before the absolute necessity of conserving all forms of energy. It therefore behooves the State to give the question of the use of its surplus waters the most careful consideration and reduce to a minimum the wastage of power. State officials and others who have given the subject some thought agree that a strong, definite policy should be adopted in treating the broad question of power development and flood control in the rivers and streams of the state. I am strongly of the opinion that the State should not embark in any proposition of this nature or become a party to any undertaking until the many varied and complex problems which are involved have been approached from all angles and solved in such a way as to insure the greatest ultimate benefit to both the State at large and its citizens.

"There is, however, a situation which confronts the State today that, in my opinion, merits immediate consideration at your hands: The construction of the Barge canal has incidentally made available for development power aggregating several thousand horse-power, and situated as it is on the line of the canal it is available for use in the thriving communities that border the

State's waterways. Under present laws the State is prohibited from disposing of any surplus waters thus created. I believe that legislation could be so drawn as to permit the leasing of these waters under long term leases which could safeguard canal interests. By taking such action the State would be assured of additional revenue, the amount of power within the limits of the State and available for industrial purposes would be increased and there could be no possible interference with any policy which the State may hereafter adopt in treating the general question of stream conservation. Failure to permit this surplus power to be put to some good and useful purpose is not in my opinion justifiable and I ask that you give the subject the most serious consideration."

BARGE CANAL TERMINALS

WORK OF THE YEAR

Work on canal terminals has progressed steadily during the past year. Most of them had been equipped with dockwalls and terminal areas prior to the canal opening last spring, and at several localities there were temporary warehouses and partial equipments of freight-handling devices, so that the terminals were ready for whatever traffic might be offered. This summer these facilities have been enlarged and added to so far as it was possible to do so. Some new freight-houses were constructed, some rail connections were made and freight-handling apparatus was installed.

STATUS OF TERMINALS

The status of each terminal at the present time appears in a brief statement in the following paragraphs. The arrangement is geographical.

New York Bay and Hudson River

Gowanus Bay. 870 ft. of bulkhead wall built; one pier 150 ft. by 1,200 ft. under construction; plans for shed on this pier in preparation; water 35 ft. deep except at piers and immediately

adjacent to bulkhead, where depth is 12 to 15 ft.; 30 acres of graded area back of the bulkhead walls.

Pier 5, New York City. Existing pier 550 ft. by 70 ft.; 2 auto-cranes and portable conveyor installed.

Pier 6, New York City. Existing pier has been enlarged to 563 ft. by 85 ft.; freight-house under contract.

Long Island City. Existing bulkhead 675 ft. long; freight-shed and paving of site under contract.

Greenpoint. Existing pier 320 ft. by 26 ft.; new pier 410 ft. by 90 ft. built; 300 ft. bulkhead wall available; 4 acres area and concrete warehouse 161 ft. by 61 ft. available.

Mott Haven. Bulkhead wall built and area graded.

West 53rd Street. Pier under construction.

Albany. Dockwall 1,510 ft. long built; area 60 ft. wide paved; one 12-ton steel derrick installed; freight-house completed; track connections with D. & H. R. R. made.

Troy (Lower Terminal). Dockwall 960 ft. long built; area graded and partly paved; freight-shed with area of 2,285 sq. ft. built; two 3-ton steam-operated timber derricks and one 2-ton auto-crane installed; track connections with New York Central and Boston & Maine railroads made.

Troy (Upper Terminal). Contract to raze buildings and grade area awarded.

Cohoes. Wall 150 ft. long available for light draft boats.

Champlain Canal

Mechanicville. Dockwall 430 ft. long built and area graded; freight-house with floor area of 480 sq. ft. built; one 2-ton timber derrick installed.

Schuylerville. Section of old canal maintained in lieu of other terminal construction.

Thomson. Dockwall 240 ft. long built and area graded.

Fort Edward. Dockwall 640 ft. long built and area graded; freight-house with floor area of 480 sq. ft. built; one 2-ton timber derrick installed.

Whitehall. Dockwall 470 ft. long built and area graded; freight-shed with floor area of 2,560 sq. ft. practically completed; one 12-ton steel derrick installed.



BARGE CANAL TERMINAL AT PIER 5, E. R., NEW YORK

While the other New York city terminals are under construction, most of the canal traffic is accommodated at this pier, since, after the State acquired it, it could be used without many alterations.

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Port Henry. Pier 500 ft. by 75 ft. built; freight-house with floor area of 480 sq. ft. built.

Plattsburg. Pier 400 ft. by 200 ft. built.

Rouses Point. Pier and dredging begun by contract cancelled under provisions of chapter 585, Laws of 1918.

Erie Canal

Waterford. Wall 300 ft. long available; existing store-house available.

Crescent. Dockwall 150 ft. long built.

Schenectady. Dockwall 1,020 ft. long built and area graded and paved; freight-house with floor area of 1,600 sq. ft. built; one 2-ton timber derrick, one auto-crane and one portable package conveyor installed; track connections with New York Central railroad made.

Amsterdam. Dockwall 600 ft. long built and area graded and paved; two freight-houses with combined floor area of 6,000 sq. ft. built; one 2-ton timber derrick and one auto-crane installed.

Fonda. Dockwall 600 ft. long built and area graded and paved; freight-house with floor area of 1,600 sq. ft. built; one 2-ton timber derrick installed.

Canajoharie. Dockwall 410 ft. long built and area graded; freight-house with floor area of 1,600 sq. ft. built.

Fort Plain. Dockwall 300 ft. long built and area graded; warehouse with floor area of 3,200 sq. ft. built; one 2-ton timber derrick installed.

St. Johnsville. Dockwall 340 ft. long built and area graded.

Little Falls. Dockwalls 600 ft. long built and area graded; two freight-houses with combined floor area of 6,400 sq. ft. built; one 2-ton timber derrick, one 12-ton steel derrick and one auto-crane installed.

Herkimer. Dockwall 500 ft. long built and area graded; two warehouses with combined floor area of 2,080 sq. ft. built; one 2-ton timber derrick and one auto-crane installed.

Ilion. Dockwall 600 ft. long built and area graded; freight-house with floor area of 960 sq. ft. built; one 2-ton timber derrick installed.

Frankfort. Dockwall 300 ft. long built and area graded and paved; freight-house with floor area of 960 sq. ft. built; one 2-ton timber derrick installed.

Utica. Dockwall 1,160 ft. long built and area graded and paved; freight-house with floor area of 6,374 sq. ft. built; one 2-ton timber derrick and one auto-crane installed.

Rome. Dockwall 910 ft. long built and area graded and paved; freight-house with floor area of 6,150 sq. ft. built; one 2-ton timber derrick, one 12-ton steel derrick and one auto-crane installed.

Cleveland. Dockwall 150 ft. long built.

Brewerton. Dockwall 470 ft. long and mooring pier 1,010 ft. long available.

Syracuse. Under construction. Now available: Two piers 350 ft. by 100 ft., giving, together with bulkhead, 3,180 ft. of mooring length; freight-house with floor area of 5,980 sq. ft., and one auto-crane. Four 2-ton timber derricks delivered; rail connections with New York Central and D. L. & W. railroads pending.

Baldwinsville. Walls 690 ft. and 570 ft. long, respectively, available.

Weedsport. Wall 150 ft. long available.

Lyons. Dockwall 360 ft. long built, area graded and freight-house built.

Newark. Wall 650 ft. long available and area graded; freight-house with floor area of 1,680 sq. ft. built.

Palmyra. Wall 570 ft. long available and area graded.

Fairport. Wall 650 ft. long available and area graded.

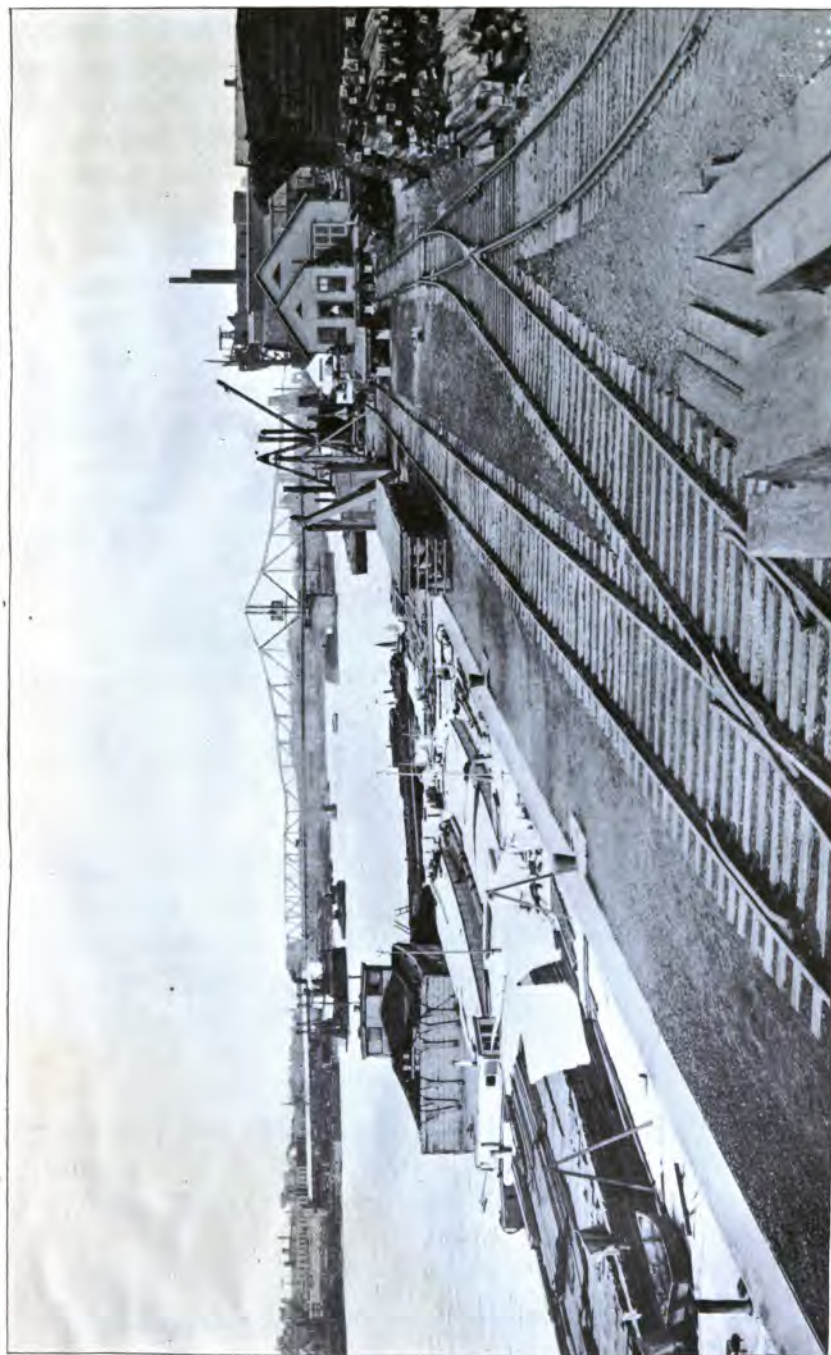
Pittsford. Wall 400 ft. long available and area graded.

Rochester. Under construction; temporary terminal on old canal used.

Spencerport. Wall 270 ft. long available with graded area; freight-house with floor area of 480 sq. ft. built; one timber derrick installed.

Holley. Wall 300 ft. long available; freight-house with floor area of 480 sq. ft. built.

Albion. Wall 400 ft. long available with graded area; freight-house with floor area of 1,600 sq. ft. built; one 2-ton timber derrick installed.



BARGE CANAL TERMINAL (LOWER) AT TROY

This terminal is the transfer station between the canal and New England points. The track at the left connects with the New York Central, that at the right with the Boston and Maine.

Medina. Wall 490 ft. long available and area graded; freight-house with floor area of 1,680 sq. ft. built; one 2-ton timber derrick installed.

Middleport. Dockwall 250 ft. long built.

Lockport (Lower Terminal). Wall 1,000 ft. long available, area graded and paved; freight-house with floor area of 3,200 sq. ft. built; one 12-ton steel derrick and one auto-crane installed.

Lockport (Upper Terminal). Wall 720 ft. long available, area graded and paved; freight-house with floor area of 3,200 sq. ft. built.

North Tonawanda. Wall 910 ft. long available, area graded and paved; warehouse with floor area of 2,400 sq. ft. built; one 12-ton steel derrick installed.

Tonawanda. Wall 940 ft. long available, area graded and paved; freight-house with floor area of 2,500 sq. ft. built; one auto-crane installed.

Buffalo, Erie Basin. Under construction. Now available: Two piers 600 ft. by 150 ft. and 420 ft. by 150 ft., respectively; area paved; warehouse with floor area of 6,000 sq. ft.; one auto-crane.

Buffalo, Ohio Basin. Under construction.

Oswego Canal

Fulton. Wall 2,000 ft. long (800 ft. for dockage and 1,200 ft. for mooring) available.

Oswego (River Terminal). Wall 590 ft. long built.

Oswego (Lake Terminal). Pier 1,010 ft. by 150 ft. built; rail connections made; area paved.

Cayuga and Seneca Canal

Seneca Falls. Walls 1,200 ft. and 400 ft. long, respectively, available.

Ithaca. Wall 670 ft. long built.

EQUIPMENT PLANS

Studies have been made to determine the requirements for freight-handling machinery at the principal terminals and a

tentative layout for equipping each of these places has been prepared. These equipments include 3-ton full portal and semi-portal revolving jib cranes, locomotive cranes, light and heavy duty stiff-leg derricks, package conveyors, burtoning devices, dock winches, capstans, battery trucks, carrying trucks, small tractor cranes and conveyor cranes. Ultimately nearly all of these machines except the small tractor cranes and certain locomotive cranes will be electrically operated.

In selecting the equipment at each of the terminals where tentative plans have been worked out, consideration has been given to both the volume and the character of the prospective traffic. It may be some time before all these equipments are installed, but whatever machinery is placed in any particular terminal will be in conformity with the adopted tentative layout, unless experience and traffic development along some unexpected line dictate a change of plan.

Suitable electric installations are planned, so that the terminals may be lighted and the machinery supplied with power for operation.

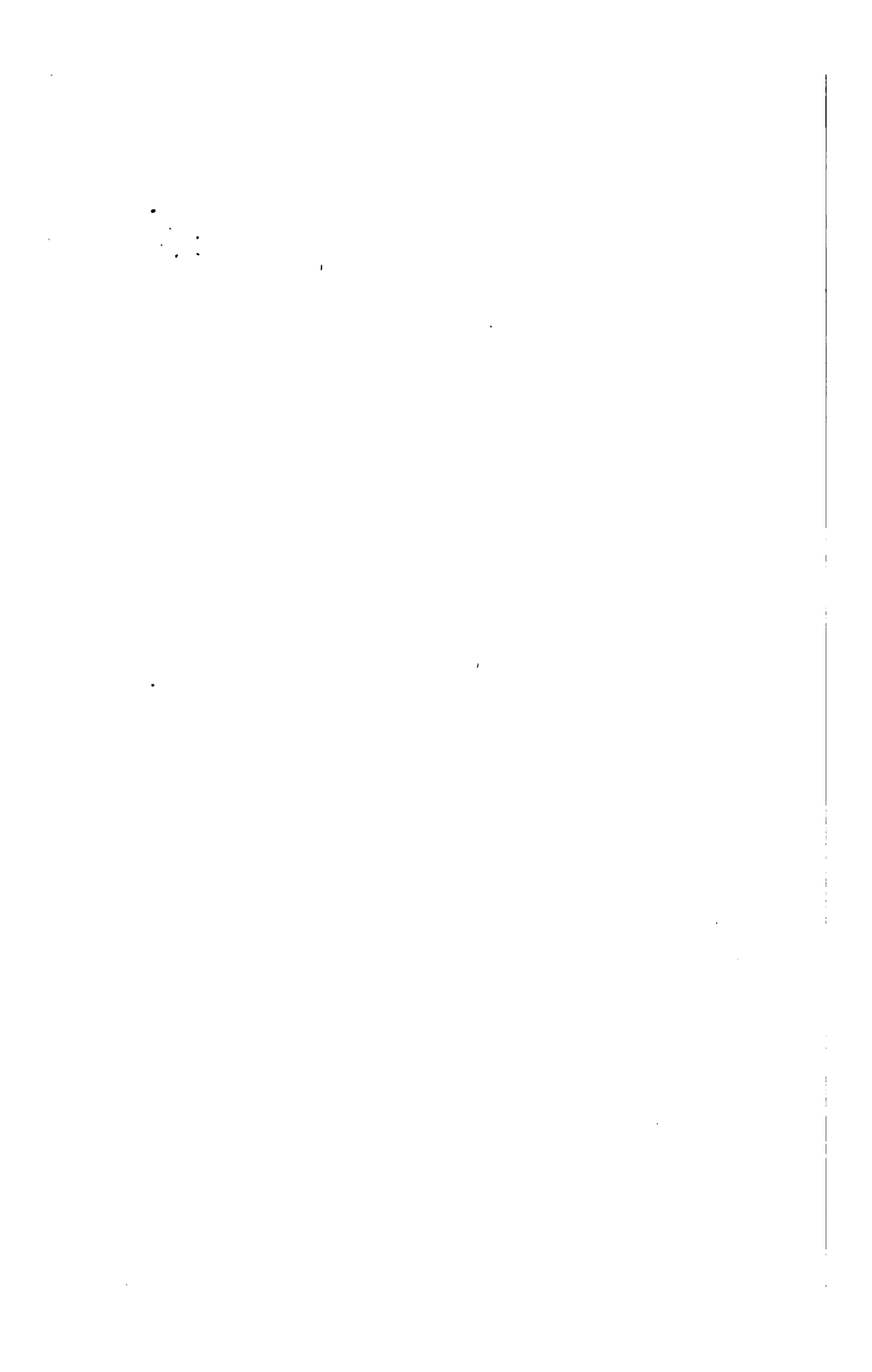
The completion of the terminals is not as far advanced as I would have it, but their status is as favorable as it was possible to make it under prevailing conditions. All work during the past two construction seasons has had to be subordinated to the more important demands of the Federal Government, and its progress has suffered seriously in consequence. While this affected the up-State terminals to a considerable degree, it much more completely dominated the terminal situation in New York city.

At the terminal in Gowanus bay we are trying to construct a 1,200-foot pier with a depth of 35 feet of water alongside, to provide transfer facilities between canal barges and ocean-going vessels. Part of the site of this terminal has been occupied for over a year by the Navy as a place for storing coal barges to be used in coaling ships, and during the last two months the United States Transport Service of the Army has filled the balance of the available water area with barges, over which the State has no police control.

In the construction of the 700-foot pier at 53rd St., North



Two railroad tracks and a front and a back crane rail are shown. The trolley wire enables the General Electric Co., the chief user of the Schenectady terminal, to run its cars directly from works to dock.



river, there was required considerable timber which had to be brought from the South. On several occasions this timber was commandeered in transit to be used in necessary government ship-building, involving long delays before replacements could be secured.

The work on the terminal at Newtown creek has been completed to a point which would permit of its use to a considerable extent except for the fact that it has no proper approach. The opening of this approach, which must be provided by the city, has been delayed by the fact that the French Government occupies one or more buildings on the line which the approach should properly follow and it appeared that this could not be disturbed. Negotiations for the opening of this approach were taken up by this Department two years ago.

At Rogers street, where there is a dock already existing, similar negotiations for an approach have not yet resulted in anything tangible having been accomplished. Because of difficulty in securing suitable waterside accommodations, the State has permitted the contractor constructing the subway under the East river at this point to occupy a portion of this terminal site.

The terminal at 138th St., Bronx, has been finished to a point which will enable us to undertake at once the work of grading and shed construction. At this terminal was experienced much difficulty due to harbor regulations made necessary by the military precautions covering the towing of excavated material to sea.

This Department is proud of the fact that 168 of its engineers gave their services to the military forces of the Government. These men were difficult and in some cases impossible to replace, and the designing staff of the Department as well as the construction staff has been sadly crippled.

Work should have been begun at Flushing and at Hallett's Cove a year ago, but the best we can hope to do is to get it started this winter. Piers 5 and 6, East river, should have been equipped with sheds and machinery, but with the delays due to the necessity for priority orders we shall do well to have them fully equipped by this spring.

COMPLETION OF TERMINALS

The Legislature must squarely face the financial situation with reference to the terminals. At most of the principal points where terminals are located the terminal law laid down specific directions as to ultimate development, based on an estimate of cost made in 1910. This entailed construction which, because of the remarkable condition in the labor and material markets, cannot be completed within the appropriations provided. The operation of the so-called Walters Act (chapter 585, of the Laws of 1918) will also very seriously affect these appropriations. At several points, of which Troy and Rochester might be named as examples, the appropriations made are found to be entirely inadequate to provide for more than a very partial working development. With the funds available already expended or obligated, it will be impossible to secure at either of these points anything like a satisfactory result. At other places a similar condition will be found to exist. In New York city, as I have explained to you in previous reports, so many sites additional to those named in the law have been acquired by the State for terminals that it is extremely doubtful if the appropriations for terminals in New York city, after being drawn upon to pay for the high-priced property taken, would be available to more than partially complete their equipment. Some points on the canals, which have not been provided for under the law, are asking for canal terminal facilities. These cannot be granted unless appropriations for that purpose are made by you. I recommend that appropriations to permit of the development of Barge canal terminals to a point which will enable them to serve the purpose for which they were intended, be given consideration by you.

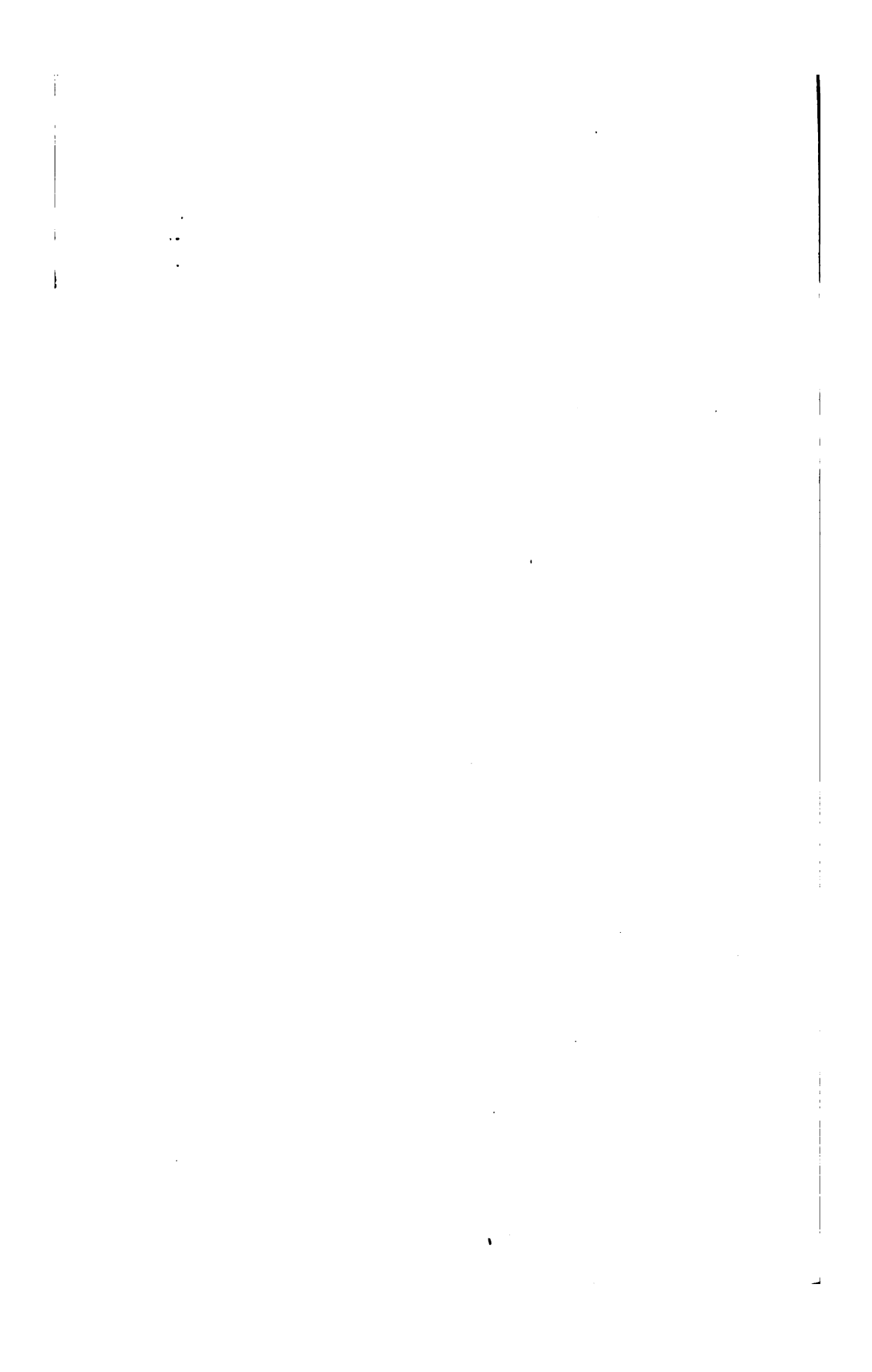
HUDSON RIVER CITIES

The Legislature of 1918 made an appropriation for purchasing Barge canal terminal sites at Poughkeepsie, Kingston, Newburgh and Yonkers and for preparing plans for terminal construction at these places. Preliminary surveys have been completed preparatory to acquiring the sites and making the plans. It is



PORTABLE PACKAGE-FREIGHT CONVEYOR

This conveyor may be used for both loading and unloading, and transfers packages between boat and freight-car, truck or warehouse. This view is at the Schenectady terminal and shows the tracks and pavement in place.



expected that these sites will be in the possession of the State before spring and appropriations should be made for developing them.

GRAIN ELEVATORS

If the canal is to take a leading part in the carrying of grain, it is apparent that additional elevator capacity suitable to canal needs must be provided in New York harbor. The fact that from fifty to one hundred million bushels of wheat are received in Buffalo yearly, destined for the seaboard, indicates an opportunity on the part of the canal for its transportation.

The Barge canal terminal at Gowanus bay, Brooklyn, offers exceptional opportunity for the location of a grain elevator system with ample storage bins to provide for the transfer of grain from barge to ship. The State already is in possession of an area large enough to accommodate any reasonable development of this character. The terminal pier which is being constructed at this locality has been so planned that it can accommodate the necessary grain-carrying portions of an elevator system without requiring the strengthening of its foundations. Neither the Barge Canal Law nor the Canal Terminals Law makes any provision for the construction of elevators. This subject should be given careful attention by you and a determination reached as to the State's policy in this respect. Private enterprise can scarcely be expected to move, in view of the uncertainty as to the State's position.

WORK UNDER CHAPTER 585, LAWS OF 1918 (THE ACT FOR CANCELING CONTRACTS AND COMPLETING WORK UNDER WAR CONDITIONS)

In my last annual report to this body I called attention to war conditions as affecting the operations of the contractors and pointed out that in the face of certain heavy financial losses the majority of them had continued their work, and I recommended the passage of remedial legislation. The 1918 Legislature gave consideration to this matter and a bill was passed which, upon signature by the Governor, became chapter 585 of the Laws of 1918, entitled, "An act relating to contracts for the construction of public works."

Under authority of this act the Canal Board was empowered to cancel and annul contracts, in force at the time the act became a law, covering the construction of the Barge canal and its terminals entered into prior to April 6, 1917, or could cancel on certificate of the State Engineer that non-completion of a contract prior to April 6, 1917, was due to conditions and circumstances beyond the control of the contractor. The act further provides that in the event of the cancelation of a contract the unfinished work or any part of it may be completed under a new contract to be entered into with the former contractor at actual cost and expense or the completion of the unfinished work can be accomplished under the terms of a new contract prepared and advertised in the usual manner, or the State is empowered to complete the unfinished work with its own forces. In the event of the cancelation of any contract, the actual and necessary cost and expense to the contractor is to be determined from April 6, 1917, to the date of cancelation and he is to be paid the difference between such actual cost and expense and the amount he would have received for work performed at the contract prices established in his original contract. Applications were received from 29 contractors for the cancelation and annulment of contracts under the provisions of the law. Favorable consideration has been given 25 of these applications and the Canal Board has refused to cancel 3 contracts. No final action has been taken with respect to the remaining application. The intent of the act was specific and clear, that no profit should be allowed to the contractor for work performed between April 6, 1917, and the date of the cancelation of his contract, or for any work the contractor might be called upon to perform subsequent to the date of cancelation in completing unfinished work on the original contract. Realizing that this is somewhat unusual legislation and that by its terms practically complete responsibility was placed upon the State Engineer for its proper administration, I have given the matter much of my time and a great deal of thought and study. In order to assure myself as to the proper construction of the provisions of the law, I have called upon the Attorney-General from time to time for opinions covering certain points and have his rulings, in accordance with which I have acted. Such decisions as I have been



TEMPORARY DAM IN THE GENESSEE RIVER

By means of this dam through Barge canal navigation across the whole state could be opened for the season of 1918. The permanent dam is under construction farther downstream.

called upon specifically by the act to make, I have made to the best of my ability, having in mind at the same time the interests of the State and fairness to the contractor.

In order to arrive at a determination of the actual and necessary cost and expense to the contractor for carrying on his work, it was necessary to examine and audit his books, and for that purpose, under authority of the Canal Board, I engaged the services of Lybrand, Ross Brothers & Montgomery, accountants and auditors of New York city, to make these necessary examinations. The certification to me of the results of such examinations, the opinions of the Attorney-General covering doubtful points in the law, and my own decisions on those points which the law has left to my sole determination, have enabled me to present to the Canal Board at its meeting on December 27, 1918, certificates for two contracts, and from the present progress of the work I anticipate that certificates on the remaining contracts can be fully completed and presented within the next two months.

SALE OF ABANDONED CANAL LANDS

In both the preliminary Barge canal estimate and the law authorizing construction, a provision was included for selling canal lands no longer of use for canal purposes and applying the proceeds to the cost of construction. The time has now come when such action is in order.

Already the old canal lands in the city of Schenectady have been sold and the sale was conducted in such a manner as greatly to benefit the State. The greater part of the land was purchased by the city, which thus secured a much-needed site for a boulevard. The prices obtained for the lands were concededly fair for both the State and the buyers. The city's portion brought \$248,791.00, while that secured by the General Electric Company sold for \$97,397.00 and the part taken by the American Locomotive Company and the Delaware and Hudson Railroad Company added \$36,018.00. By this sale the State has escaped the necessity of maintaining bridges and of draining the old canal bed and keeping it in a sanitary condition subject to Board of Health regulations. A condition of the sale was that the State was relieved of any

obligations growing out of any encroachment litigation that may arise. It was possible to employ authoritative maps and descriptions of the lands because of the "Blue Line Surveys" made by this Department under special appropriation.

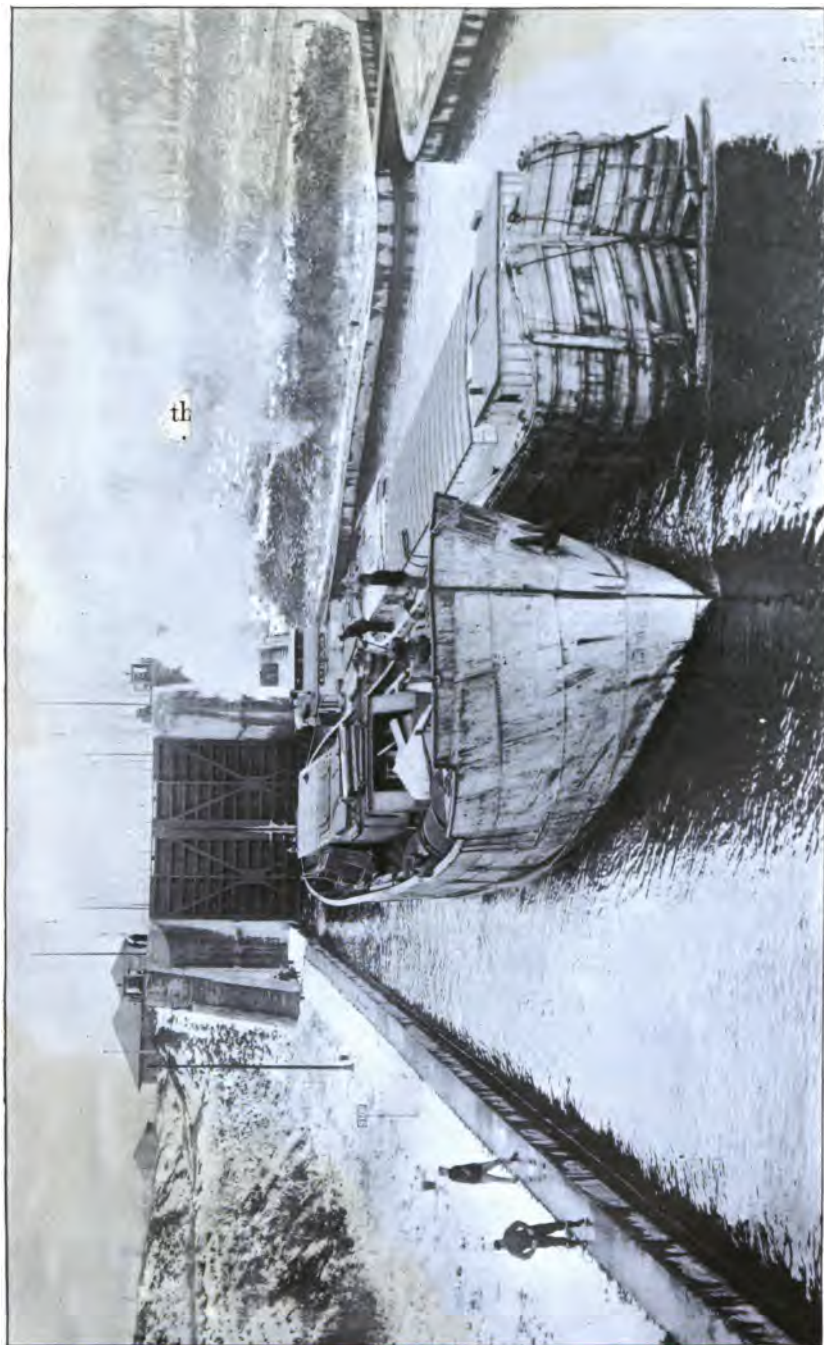
It is the purpose of the Canal Board to dispose of abandoned canal lands as fast as possible. However, it is not intended to sell isolated parcels, but to conduct the sales in such a way that long stretches are almost certain to find purchasers at one time. This prevents leaving in the hands of the State isolated parcels which carry with them responsibilities of draining, etc. A plan has been adopted for receiving at public sale offers on single parcels and also on a group of adjacent parcels, the State reserving the right to accept the more advantageous offer. The Land Board has no organization for looking after and protecting any land which may come under its jurisdiction. The Superintendent of Public Works has such an organization. Until the old canal lands are taken over by the Land Board for disposal, they are under the control of the Superintendent of Public Works. Accordingly the Land Board does not assume control of these lands until it is nearly ready to conduct a sale.

INDUSTRIAL SITES ALONG CANAL

The abandoned canal lands furnish some excellent sites for industrial plants. In general this property is near the new canal and a plant located upon it may enjoy the benefits of water transportation. In most localities also railroads are near by. If legislative provision is made to sell the surplus water-power that is available at canal structures, there will be presented another incentive for locating factories on old canal lands.

PLANTING OF TREES ON CANAL LANDS

There are a number of areas adjacent to the new canals which were appropriated for the purpose of finding room for the disposition of excavated material taken from the channel. In a few cases reconveyances of such appropriations have been made to the former owners. In the majority of cases, however, it is not



A STEAM TRAWLER PASSING THROUGH THE BARGE CANAL
This vessel was built at a Great Lakes shipyard and was transported through the canal for service on the ocean.

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deemed wise for the State to part with the ownership for the reason that they may come into use at almost any time for the deposit of material taken from the channels in the course of maintenance. In many cases the former owners would not accept a reconveyance of an altered property and a conveyance to a third party would not yield the State a compensation considered at all adequate. Much of this property is also in small parcels and of such irregular shape as to be of no particular value to a private owner. I would suggest to you therefore the desirability of planting trees on such areas as are adapted to such tree-planting and on which the existence of trees would not be detrimental in any way to the operation of the canal. It is possible that in the course of maintenance a small proportion of such trees might be destroyed, but the probability is that the majority might never be disturbed. Much of the land on which the excavated material has been placed was originally excellent river farm land, which has now been covered by sand, gravel, clay or disintegrated rock to a depth of three or four feet. The underlying soil should prove advantageous to the growth of trees, once their roots have struck into it. Such tree-planting might well be done under the direction of the Superintendent of Public Works with the advice of the Conservation Commissioner.

BLUE LINE SURVEYS

During the past year not so much progress has been made in surveying and mapping the boundary lines of the old canal as had been anticipated. A shortage of men has been experienced in engineering as well as in other kinds of work and this Department could not get as many men as it needed. It was necessary to curtail work along certain lines and it seemed that the blue line surveys would suffer least by the delay.

More time is needed to make the surveys than was thought necessary at first, and the reason for this is that it has been found advisable to prepare the land for sale by subdividing it into parcels which correspond in general with adjacent property lines, or into parcels on which the sales will probably be made. The surveys are now progressing on this basis.

The blue line work on the Eastern Division is nearly completed, while that on the Middle Division is well advanced, but on the Western Division little has been done. It is necessary to complete these surveys, since the sale of old canal lands depends on them. I recommend that \$45,000 be appropriated this year for continuing the work. With an appropriation of this amount, together with the unexpended balance of last year's fund, it is hoped to put on a sufficiently large force to substantially complete the work during the coming fiscal year.

SPECIAL CONSTRUCTION AND SURVEYS

Pieces of construction work, other than Barge canal, which have been under the supervision of the State Engineer during the year are the following:

Eighteen-Mile creek culvert (chapter 626, Laws of 1917).
Whitesboro street bridge, Rome (chapter 753, Laws of 1917).
Canandaigua harbor dockwall (chapter 756, Laws of 1917).
Ellicott creek improvement (chapter 624, Laws of 1913, and amendatory acts).
Hertel avenue bridge, Buffalo (chapter 761, Laws of 1917).
Cowaselon creek improvement (chapter 781, Laws of 1917).
Lake street bridge, Geneva (chapter 351, Laws of 1918).
Repairing sea-walls, Orient Point, L. I. (chapter 428, Laws of 1918).

Special surveys — including in some cases the preparation of plans — have been made as shown in the following tabulation. This list is exclusive of boundary line surveys and also of surveys made for other departments and commissions.

Proposed Barge canal branch to Auburn (chapter 376, Laws of 1917).
Tonawanda creek at Batavia (chapter 453, Laws of 1917).
Great Western Gateway bridge at Schenectady (chapter 735, Laws of 1917).
Location for bridge between Crescent and Rexford (chapter 742, Laws of 1917).
Canal route between Tonawanda and Buffalo (chapter 743, Laws of 1917).

Limestone creek improvement (chapter 339, Laws of 1918).

Yorkville bridge approach (chapter 752, Laws of 1917).

Glen, or Mill creek improvement, Watkins (chapter 341, Laws of 1918).

Dive culvert, Rome (chapter 346, Laws of 1918).

Eighteen-Mile creek improvement (chapter 425, Laws of 1918).

Mill river improvement (chapter 427, Laws of 1918).

Hudson river terminal sites at Poughkeepsie, Kingston, Newburgh and Yonkers (chapter 555, Laws of 1918).

In the past it has often happened that the Legislature has made an appropriation for the improvement of a certain stream and has followed this subsequently with appropriations for other portions of the same stream, but each appropriation has been made without any definite plan to make the several improvements parts of a predetermined and well-considered whole. Some of the special surveys of the past year have been made in accordance with an intent to correct this error. The whole stream has been surveyed and a comprehensive plan has been prepared for its complete improvement. If the Legislature shall determine to improve this stream, but shall make an appropriation sufficient for only a part of the whole project, then the work may be carried on in a piecemeal but orderly manner, the end in view being the eventual accomplishment of the whole improvement. I would suggest to you the advisability of referring to this Department for a comprehensive survey of any project deemed worthy of consideration by you, making an initial appropriation for such survey before you attempt to make appropriation for the improvement itself. Such a course will enable you to inform yourselves of the amount of expenditure which will be involved in any particular complete project before you embark upon it.

BOUNDARY LINES

The State Engineer is directed by law to make periodic examinations of the boundary lines between New York and adjoining States. During the past year no such examinations have been made, but during the present year certain of the lines should be

examined. Therefore I recommend that \$1,000 be appropriated for this purpose.

However, during the year surveys have been partially or entirely made of three county boundary lines. Also three monuments placed by this Department in 1914 on another county line have been relocated above the water-line of a projected reservoir.

By chapter 559, Laws of 1918, a survey of a portion of the boundary line between the counties of Delaware and Schoharie was authorized. The line to be surveyed extended from the meeting point of Delaware, Greene and Schoharie counties at Schoharie creek to a point at Lake Utsayantha. This survey has been completed and the line has been properly monumented.

In accordance with the provisions of chapter 561, Laws of 1918, a survey was undertaken of the line which forms the boundary between the townships of Warrensburg and Luzerne, Warren county, by its eastern portion, and between Warren and Saratoga counties by its western portion. After an extended search it was decided that the line which this act desired to established was authorized and established by an act of March 12, 1772, and was defined as being a line running due west from Fort George. The intent of that act of 1772 was clearly the establishment of a line running due west according to magnetic bearing. From the best data available it was calculated that in 1918 the true bearing of this line would be approximately S. 83° W.

Because of the rough and wooded character of the country immediately west of Fort George and extending to the Hudson river, the survey was carried on by triangulation and followed the general computed westerly direction. Very little was found between Fort George and the Hudson river to indicate the line as originally established, and an extended search failed to locate authoritative points along the line westerly from the river or at the extreme west end of the line. There was found, however, a growth of blue-beech trees on the west bank of the Hudson river which is believed to be on the line. This was the best established point secured and the one nearest the calculated true line and was therefore accepted as a point on line. Then that portion of the line between Fort George and the Hudson river was established and monumented. Enough of the line was thus located to be of

service in pending litigation, in which the State is particularly interested.

The law also required "That the State Engineer and Surveyor shall also locate the lines of grants, patents and allotments thereof adjacent to said town and county lines." To locate all these lines would be an almost endless task, and could not be completed even with the additional appropriation asked. None of this work was attempted except on that portion of the line, as established by this survey, between the towns of Warrensburg and Luzerne, where some of the lot lines of Jessup's patent immediately adjacent were tied into the town line.

The establishment of the line farther westward was not possible with the funds available. In order to make prompt use of points already established, now that the survey of this line has been started, I recommend an additional appropriation of \$3,000 to finish this survey.

Chapter 562, Laws of 1918, is entitled, "An act to provide for establishing a portion of the north boundary line of the County of Ulster, and being a portion of the south boundary line of the County of Greene, and known as the north boundary line of Great Lot Number eight, Hardenburgh patent." The portion of this line which it was proposed to establish by this survey was that part which begins near the Ox Clove and runs northwesterly about nine miles.

When search was made for data to establish this line, it was found that the original line, establishing the north line of Great Lot No. 8, Hardenburgh Patent, extended from "Monument No. 14", on the east branch of the Delaware river, to a point known as "Monument No. 4," which is located somewhere near the Saw kill in the present town of Woodstock, Ulster county. "Monument No. 14" was located and was found to be well established. Such records as contain data regarding this line give a bearing southeasterly from this point. This bearing was followed. However, as the line was carried forward several points which were reputed to be on line were found not to be in the same line and it became necessary to carry the line forward to the location of "Monument No. 4". Consequently instead of about nine miles of line it has been necessary to carry the line about 30 miles.

Almost all of this is through wooded and mountainous country. Because of the difficulty of securing a positive location for "Monument No. 4" extensive search has been carried on for positive data on this point. It is now believed that its true location can be secured.

However, due to lack of funds the work has been discontinued and can be satisfactorily finished only when more money is made available. I recommend that an additional appropriation of \$2,000 be made for completing this survey.

In 1914 a survey was made by this Department which located a portion of the boundary line between Greene and Schoharie counties. Three monuments on this line were placed at Schoharie creek about $1\frac{1}{8}$ miles north of the Devasego Falls. Because of the intended flooding of the land at this point by the construction of a reservoir by the Board of Water Supply of the City of New York it became necessary to relocate these monuments on ground which is above the proposed new water-line. The work of relocating these three monuments has been done by the Board of Water Supply and they are now situated as described in an accompanying detailed report.

COURT OF CLAIMS SURVEYS

During the year this Department has continued its work of supplying the Attorney-General and the Claims Agent with maps and reports in aid of the preparation of evidence to defend the State in actions brought on account of claims for damages alleged to have resulted from the operation and maintenance of the old canal. I recommend that the sum of \$5,600 be appropriated for the continuation of this work during the present year.

COOPERATION WITH FEDERAL SURVEYS

For years New York State has coöperated with the Federal Government in carrying on the United States Geological Survey, in both hydrographic and topographic work. I recommend that the usual amount of \$2,500 be appropriated as the State's share for the stream gaging work for the ensuing year. This is a very important work and an uninterrupted continuity is one of its essential requirements.

MISCELLANEOUS SURVEYS

The surveys which this Department has made for other State departments have been numerous. They include surveys for the Troy armory, the Malone armory, the Schuyler mansion at Albany, the State office building at Albany, the Marcy State hospital, the Middletown State hospital, the West Haverstraw State hospital, Dannemora prison, the Craig Colony at Sonyea (a survey of 1,900 acres, requiring six months to make), Kings Park hospital on Long Island (including plans for a concrete reservoir) and Wards Island at New York. These surveys were paid for out of the fund which is made available for this purpose.

The Department has also made surveys at the request of other departments, but in these cases the cost has been borne by the department making the request. These pieces of work were at Wingdale prison, for which plans for a dam and reservoir were made and the grading of the building area supervised; at the Quarantine Station at Hoffman Island, for which repairs to the landing pier were supervised; and in connection with an outer belt line to connect all the railroads entering New York city from the west. This latter survey, which has been begun but recently, was undertaken at the request of the New York-New Jersey Port and Harbor Development Commission.

I recommend that the sum of \$10,000 be again appropriated for the surveys which the State Engineer is called upon to make for other State departments and commissions.

LAND GRANTS

By an act of 1917 the State Engineer is charged with the duty of making investigations to determine whether all the conditions have been carried out under which grants have been made by the Land Board. Report is made to the Attorney-General, who, if occasion demands, may bring action to annul the grants. There have been made 442 reports by the State Engineer under authority of this law. To carry on these investigations and to make the necessary corrections and additions to the official maps, I ask that \$4,000 be appropriated.

DEPARTMENT MEN WITH THE COLORS

The engineer occupies a very important place in modern warfare. It is with the feeling of justifiable pride that I call your attention to the number of men in the State Engineer's Department who responded to the call to arms and entered the military establishment of the United States. Of the 600 members of this Department 168 were so enrolled. While naturally a large part of this number found its way into the engineering regiments, this Department was represented in almost every branch of service both on land and sea.

I append herewith a list giving the names of those who entered the military service and I do this both as a matter of information to you and also with the feeling that this may serve as a permanent record.

HONOR ROLL, DEPARTMENT OF STATE ENGINEER

Preceding the names appear the respective ranks of the men while in the Department.

Junior Asst. Engr..	J. M. ANGUS.....	1st Lieut.....	302d Field Artillery
Assistant Engineer.	A. G. AUSTIN.....	1st Lieut.....	472d Engineers
Junior Asst. Engr..	R. W. AUSTIN.....	1st Lieut.....	Chemical Gas Service
Junior Asst. Engr..	M. L. BABCOCK.....	Ensign.....	U. S. Naval Reserve
Junior Asst. Engr..	LEROY BAMER.....	Private.....	Medical Corps, Casual Detachment
Laborer.....	F. S. BARCLAY.....	Private.....	303d Engineers
Junior Asst. Engr..	J. S. BIERHARDT.....	2d Lieut.....	U. S. Air Service
Engineering Asst...	E. M. BIRDSALL.....	Private.....	Section 532, Ambulance Service
Junior Asst. Engr..	J. F. BLAISE.....	Candidate for Commission	Officers Training Camp. Honorably discharged
Engineering Asst...	A. W. BISCHER.....	Corporal.....	303d Engineers
Junior Asst. Engr..	J. H. BOVIER.....	Private.....	303d Engineers
Junior Asst. Engr..	L. J. BRADLEY.....	Sergeant.....	29th Engineers
Messenger.....	W. E. BROWER.....	Private.....	28th Battalion. U. S. Guards
Engineering Asst...	ERNEST BUDLONG.....	Private.....	Tank Service
Engineering Asst...	E. J. BULLIS.....	1st Lieut.....	31st Field Artillery
Assistant Engineer.	O. L. BURDETT.....	Captain.....	25th Engineers
Junior Asst. Engr..	W. F. BURKE.....	Seaman, 2d Class	7th Regiment, U. S. Naval Reserve
Engineering Asst...	GAIL BOWLER.....	Bugler.....	Chemical Warfare Ser.
Laborer.....	W. H. BENSON.....	Private.....	387th Co., U. S. Marines
Assistant Engineer.	R. D. CAMERON.....	Private.....	Engineers Officers Training Camp
Junior Asst. Engr..	J. J. CARROLL.....	Private.....	5th Army Corps Head- quarters
Junior Asst. Engr..	M. J. CHRYST.....	Sergeant.....	Coast Artillery Train- ing Camp

Assistant Engineer.	H. L. CLARKE.....	1st Lieut.....	28th Engineers
Junior Asst. Engr..	E. A. CLOSE.....	Corporal.....	348th Infantry
Confidential Asst..	G. W. CODWIS.....	Ensign.....	U. S. Naval Reserve
Stenographer.....	W. L. COLLINS.....	2d Lieut.....	12th Field Artillery
Junior Asst. Engr..	L. H. COIT.....	Corporal.....	20th Engineers
Junior Asst. Engr..	C. M. COLONY.....	Captain.....	Quartermaster's Dept.
Junior Asst. Engr..	F. S. COREY.....	Sergeant.....	51st Pioneer Infantry
Junior Asst. Engr..	A. J. CROWE, Jr.....	Sergeant.....	Engineers' Candidates School
Junior Asst. Engr..	J. F. CULLEN.....	Private.....	303d Engineers
Junior Asst. Engr..	T. L. CURTIN.....	Private.....	Aero Photo Division
Assistant Engineer.	C. R. DEGRAFF.....	1st Lieut.....	Engineers Officers Training School
Junior Asst. Engr..	B. S. DAVENPORT.....	1st Lieut.....	Coast Art. Res. Corps
Junior Asst. Engr..	W. A. DAWSON.....	Private.....	303d Infantry. Honor- ably discharged
Laborer.....	H. E. DAYTON.....	Private.....	302d Engineers
Boatman.....	H. S. DEAL.....	Corporal.....	23d Engineers
Inspector.....	L. W. DONNELLY.....	1st Lieut.....	328th Field Artillery
Junior Asst. Engr..	J. T. DORIS, Jr.....	Sergeant.....	302d Engineers
Junior Asst. Engr..	E. E. R. DORNBACH.....	Sergeant.....	309th Infantry
Junior Asst. Engr..	L. W. DOUGLAS.....	Sergeant.....	23d Engineers
Assistant Engineer.	J. B. DOYLE.....	Major.....	513th Engineers
Junior Asst. Engr..	L. A. DENNER, Jr.....	Private.....	51st Pioneer Infantry
Junior Asst. Engr..	J. J. DUNNE.....	Corporal.....	U. S. Employment Ser- vice Infantry
Junior Asst. Engr..	J. F. EGAN.....	Sergeant.....	17th Training Battery, Field Art., C. O. T. S.
Junior Asst. Engr..	ROY ENGELL.....	Corporal.....	303d Engineers
Laborer.....	R. J. EVERS.....	Private, 1st Class	306th Ambulance Co.
Junior Asst. Engr..	L. E. FIELDS.....	Corporal.....	25th Engineers
Engineering Asst..	E. E. FOBES.....	Private.....	29th Engineers
Junior Asst. Engr..	J. H. FRIEDMAN.....	Sergeant.....	Utilities Detachment Q. M. C.
Stenographer.....	W. D. GARTLAND.....	Private.....	Quartermaster's Corps
Junior Asst. Engr..	J. A. GALVIN.....	1st Lieut., Engrs.	Army General Staff College
Junior Asst. Engr..	L. P. M. GAYLORD.....	Private.....	23d Engineers
Laborer.....	J. F. GILBERT, Jr.....	Private.....	U. S. Marines
Assistant Engineer.	G. EDWARD GIBSON.....	Lt.-Colonel...	Infantry, U. S. Reserve Corps, Officers Train- ing Camp. Honor- ably discharged
Engineering Asst..	H. H. GLOSSER.....	Bugler.....	56th Engineers
Laborer.....	R. J. GOLDING.....	Private.....	336th Field Artillery
Boatman.....	LAWRENCE GOODMAN.....	Private, 1st Class	3d Air Service Mechanics
Junior Asst. Engr..	A. E. GREEN.....	1st Lieut.....	351st Field Artillery
Junior Asst. Engr..	LEROY GREENALCH.....	Warrant Officer	U. S. Naval Reserve
Engineering Asst..	H. G. GUNTHER.....	Quart'rm'r, 1st Class	U. S. Navy, Aviation
Engineering Asst..	W. R. GLOCK.....	Private.....	6th Ord. Guard Co.
Assistant Engineer.	H. W. HALE.....	1st Lieut.....	Engrs. Reserve Corps, Officers Train. Camp. Honorably discharged
Assistant Engineer.	B. I. HALL.....	Captain.....	303d Engineers
Boatman.....	J. W. HANO.....	Sergeant, 1st Class	Evacuation Hospital, No. 3
Engineering Asst..	C. L. HAWKINS.....	2d Lieut.....	19th Battalion, Field Artillery
Assistant Engineer.	T. R. HAZELUM.....	1st Lieut.....	212th Engineers

Junior Asst. Engr..	H. W. HENDERSON	Private	107th Infantry
Senior Asst. Engr..	E. D. HENDRICKS	Captain	303d Engineers
Junior Asst. Engr.	W. J. HENRY, Jr.	2d Lieut.	Engineers
Engineering Asst...	H. F. HENSLEY	Private	303d Engineers. Honorably discharged
Junior Asst. Engr.	C. E. HEYDT	Private	106th U. S. Ambulance Co.
Assistant Engineer.	R. L. HOLT	Captain	Engrs. Reserve Corps, Officers Train. Camp. Honorably discharged
Engineering Asst...	E. L. HORTON	Private, 1st Class	102d Engineers
Junior Asst. Engr..	H. R. HORTON	Cadet Officer..	U. S. Naval Reserve
Junior Asst. Engr..	R. M. R. HOWARD	Private, 1st Class	26th Engineers
Engineering Asst...	P. M. HOWE	Sergeant	309th Heavy Artillery
Engineering Asst...	SAUL HURST	Seaman	Naval Reserve Corps
Junior Asst. Engr..	N. D. HYDE	2d Lieut.	Headquarters, 29th Division
Junior Asst. Engr..	J. S. HYMAN	Private	472d Engineers
Engineering Asst...	George HINDS	Private	2d Casual Co.
Senior Asst. Engr..	L. S. HULBURD	Captain	Engineers O. T. S.
Engineering Asst...	Jos. HOEHLEIN	Private	30th Co., Coast Art.
Junior Asst. Engr..	E. L. KEELER	Captain	153d Engineers
Assistant Engineer.	G. D. KELLOGG	Captain	552d Engineers Service Battalion, Construction Division
Assistant Engineer.	B. T. KENYON	Captain	Quartermaster's Corps
Junior Asst. Engr..	C. F. KEALE, Jr.	2d Lieut.	Air Service, Mil. Aero
Junior Asst. Engr..	W. G. KEESHAN	Private	2d Pioneer Infantry
Junior Asst. Engr..	H. C. KELLY	Corporal	102d Engineers
Engineering Asst...	H. F. KINNEY	Private	346th Infantry
Laborer	HENRY KLING	Quart'r'm'r, 3d Class	7th Div., Naval Auxiliary Reserve
Laborer	E. R. KRAFF	Driver	Red Cross Ambulance
Junior Asst. Engr..	MICHAEL KOVAR	Private, 1st Class	335th Machine Gun Battalion
Junior Asst. Engr..	T. R. KEESLAKE, Jr.	Sergeant	25th Engineers. Died at Camp Devens, March 5, 1918
Junior Asst. Engr..	JACOB LABISHINER	Private	Meteorological Sect., Signal Corps Aviation
Junior Asst. Engr..	J. F. LARNEY	Private	308th Infantry
Junior Asst. Engr..	J. P. LARSON	2d Lieut.	7th Engineers Train and Replacement
Junior Asst. Engr..	W. M. J. LEWIS	Private	Co. A, 2d N. Y. Infantry. Honorably discharged
Laborer	W. B. LOUNSBERY	Private	26th Engineers
Engineering Asst...	W. F. LYSETT	Corporal	515th Motor Truck Co.
Engineering Asst...	SOLOMON LEIBOWITZ	Private	Field Hospital No. 1
Junior Asst. Engr..	D. B. LYNCH	Private	312th Engineers
Private Secretary to State Engineer	L. D. MCCORMAC	Sergeant, 1st Class	Headquarters American Air Service
Junior Asst. Engr..	C. T. MCLEAN	2d Lieut.	Quartermaster's Corps
Junior Asst. Engr..	F. J. McMAHON	Private	21st Co., Coast Art.
Laborer	G. F. MARCOUX	Private, 1st Class	Medical Corps
Junior Asst. Engr..	A. J. MANTICA	Sergeant	25th Engineers
Laborer	P. L. MATTIMORE	Private	26th Engineers
Junior Asst. Engr..	ALLEN MATTISON	Private	20th Engineers

Junior Asst. Engr..	CHARLES MESSINA.....	Machinist's Mate, 1st Class	United States Naval Reserve
Engineering Asst...	E. J. MORAN.....	Private, 1st Class	102d Trench Mortar Battery
Engineering Asst...	PARNELL MORONEY....	Corporal.....	225th Aero Squadron
Junior Asst. Engr..	J. E. MORRELL.....	Private.....	26th Engineers
Engineering Asst...	W. E. MULLEN.....	Private.....	302d Engineers
Assistant Engineer.	J. T. MURPHY.....	Private.....	National Army, Detached. Honorably discharged
Junior Asst. Engr..	W. R. MILLER.....	Chief Machinist's Mate	U. S. Naval Reserve
Junior Asst. Engr..	G. C. NASH.....	Lieutenant....	Coast Artillery
Assistant Engineer.	J. P. NEWTON.....	Captain, Engrs.	Base Hospital Construction
Engineering Asst...	J. C. NOLAN.....	Private, 1st Class	25th Engineers
Engineering Asst...	G. W. NOSTRAND.....	Seaman, 1st Class	U. S. Naval Reserve
Laborer.....	F. J. NORTON.....	Private.....	Students Army Training Camp
Junior Asst. Engr..	C. V. O'MALLEY.....	1st Lieut.....	Engineers O. T. S.
Assistant Engineer.	H. J. O'NEILL.....	1st Lieut.....	U. S. Engineers
Junior Asst. Engr..	MOTT PALMER.....	1st Lieut.....	Co. 4, Engineers Officers Training Camp
Senior Asst. Engr..	E. V. R. PAYNE.....	Lt.-Colonel...	25th Engineers
Laborer.....	C. P. PLUMMER.....	Private.....	331st Tank Corps
Engineering Asst...	R. S. POLLARD.....	Private.....	23d Engineers
Assistant Engineer.	J. M. PRIOR.....	Corporal.....	U. S. A. (Special Ser.)
Engineering Asst...	E. D. PIERI.....	Seaman, 2d Class	U. S. Navy Students Army Training Camp
Laborer.....	C. F. REULE.....	Landman Machinist's Mate	9th Regiment Aviation
Engineering Asst...	E. C. REUSSWIG.....	Private.....	23d Engineers
Stenographer.....	J. L. RICHARDS.....	Stenographer..	310th Aero Squadron. Died in service, England, Oct. 15, 1918
Junior Asst. Engr..	H. S. ROBERTS.....	Sergeant.....	56th Engineers
Junior Asst. Engr..	D. D. ROGERS.....	2d Lieut.....	Quartermaster's Reserve Corps
Junior Asst. Engr..	F. C. ROGERS.....	Captain.....	U. S. Engineers
Engineering Asst...	G. A. ROGERS.....	Corporal.....	303d Engineers
Clerk.....	G. W. RUSSO.....	Sergeant.....	51st Pioneer Infantry
Engineering Asst...	THOS. RYAN, Jr.....	Private.....	26th Engineers
Assistant Engineer.	E. G. RAYNOR.....	Captain.....	Engineers Officers Training Camp
Junior Asst. Engr..	W. W. REDFERN.....	Private.....	71st Infantry
Engineering Asst...	J. J. RADUCINE.....	Private.....	Students Army Training Camp
Assistant Engineer.	SOLOMON RESWICK....	1st Lieut.....	Engrs. Reserve Corps, Officers Train. Camp. Honorably discharged
Engineering Asst...	DANIEL SCANLON.....	Private.....	Photo Division, Air Ser.
Assistant Engineer.	E. G. SEAMAN.....	1st Lieut.....	Engrs. Reserve Corps, Officers Train. Camp. Honorably discharged
Laborer.....	J. W. SHOOK.....	Sergeant.....	379th Infantry
Engineering Asst...	F. M. SISSON.....	Sergeant.....	57th Engineers
Boatman.....	A. A. SNELL.....	Private.....	303d Infantry
Stenographer.....	L. R. SPENCER.....	Sergeant.....	Headquarters 152d Brigade Infantry

Engineering Asst...	I. N. STEIGMAN.....	Private.....	Air Service
Laborer.....	E. R. STOLL.....	Ordinary Seaman	U. S. Coast Guard
Junior Asst. Engr..	W. C. STRECKER.....	Private, 1st Class	29th Engineers
Engineering Asst...	T. M. STROHMENGER...	Private, 1st Class	Q Squadron, 1st Unit, Air Service
Assistant Engineer.	C. H. SWICK.....	Captain.....	U. S. Engineers
Junior Asst. Engr..	H. C. SMITH.....	1st Lieut.....	Engineers Officers Training Camp
Engineering Asst...	E. A. TERRELL.....	Private.....	102d Engineers
Junior Asst. Engr..	J. R. TIGHE.....	2d Lieut.....	165th Depot Brigade
Junior Asst. Engr..	H. R. TOPPING.....	2d Lieut.....	Coast Artillery
Engineering Asst...	T. J. TORPEY, Jr.....	Corporal.....	102d Engineers
Laborer.....	E. S. TRAYER.....	Sergeant.....	519th Engineers
Junior Asst. Engr..	L. E. TURPIT.....	Private, 1st Class	310th Fire and Guard Co. Q. M. Corps
Stenographer.....	J. J. TOBIN.....	Army Field Clerk	Personnel Division, Adjutant-General Dept.
Junior Asst. Engr..	C. E. VEDDER.....	Corporal.....	303d Engineers
Junior Asst. Engr..	J. J. WADDELL.....	Chief Machinist's Mate	U. S. Naval Reserve
Junior Asst. Engr..	POWELL WALL.....	2d Lieut.....	Signal Corps, U. S. A.
Junior Asst. Engr..	S. E. WHITNEY.....	Corporal.....	Trade Test Board, U. S. Air Service
Division Engineer..	GEORGE D. WILLIAMS..	Captain.....	548th Engineers
Engineering Asst...	E. M. WILCOX.....	Apprentice Seaman	U. S. Naval Reserve Students Army Training Camp
Laborer.....	G. H. YERKES.....	Mechanic.....	108th Infantry. Killed in action, September 29, 1918
Laborer.....	S. A. ZIERAK.....	Sergeant.....	303d Infantry
Junior Asst. Engr..	W. J. ZABEL.....	Sergeant.....	153d Engineers

APPENDED REPORTS

The usual reports are hereto appended. First come the tables giving summaries of engineering expenses. These are followed by tables of contracts, both those completed during the fiscal year and those in force at its close. Subsequently appear the reports of the three Division Engineers. These recount the progress made during the year in the various works of engineering and construction carried on in the Department, the chief of which has been the building of the Barge canal and its terminals. Besides containing the detailed accounts of work done, these reports are supplemented by tables showing engineering expenses on the several divisions and the status of contracts in force during the fiscal year. Other appended reports are those relative to the county line surveys and others made by the engineers of this Department who are in charge of the Testing Laboratory, the Land Bureau and the Stream Gaging.

ACKNOWLEDGMENTS

The past year, particularly the early part of it, has been a trying one in many ways. The very vigorous effort made to open the canal in the face of the difficulties which presented themselves required the utmost effort on the part of the employees of this Department, and the fact that a considerable proportion of my engineering force was in the military service threw upon those left behind an additional burden, which they carried cheerfully. For this spirit of coöperation I desire to express my gratitude and appreciation.

The assistance of the Department of Public Works has been of great value in opening the canal and in the steps which had to be taken to insure that opening. The official relations between the two departments have been most agreeable and I desire to express my thanks for the assistance at all times rendered me by the Superintendent of Public Works, Major General W. W. Wotherspoon.

The Canal Board has been at all times faithful to its obligations, regular in its attendance at the many meetings necessary to be held, and, with a comprehensive grasp of the canal situation, ready to formulate and assist in carrying out such measures as were for the benefit of the canal.

Respectfully submitted,

FRANK M. WILLIAMS,

State Engineer and Surveyor.

**Engineering Expenses for the Fiscal Year Ended
June 30, 1918**

**Table of Contracts Completed During the Fiscal Year
Ended June 30, 1918**

Table of Contracts Pending June 30, 1918

**Summary of Construction Work, Barge Canal and
Terminals, by Years**

Engineering Expenses for the Fiscal Year Ended June 30, 1918

Ordinary Repairs to Canals

WORK	Act		Division	Amount	Total
	Chap.	Year			
Erie canal.....	181	1917	Eastern....	\$6,594 88	\$10,000 00
Champlain canal.....	181	1917	Eastern....	3,405 12	
Erie canal.....	181	1917	Middle....	\$9,633 69	9,964 88
Black River canal.....	181	1917	Middle....	331 19	
Erie canal.....	181	1917	Western....	\$10,000 00	10,000 00
Total.....					\$29,964 88

Construction of Barge Canal

WORK	Act		Division	Amount	Total
	Chap.	Year			
Head office account.....	147	1903*	Eastern....	\$193,755 10	\$325,378 09
Erie canal.....	147	1903*	Eastern....	87,868 12	
Champlain canal.....	147	1903*	Eastern....	43,754 87	
Erie canal.....	147	1903*	Middle....	\$80,161 51	115,948 02
Oswego canal.....	147	1903*	Middle....	16,287 56	
Cayuga and Seneca canal.....	391	1909*	Middle....	19,498 95	
Erie canal.....	147	1903*	Western....	\$171,566 55	171,566 55
Total.....					\$612,892 66

Construction of Barge Canal Terminals

WORK	Act		Division	Amount	Total
	Chap.	Year			
Eastern division account.....	746	1911*	Eastern....	\$128,037 62	\$173,316 97
Middle division account.....	746	1911*	Middle....	21,364 65	
Western division account.....	746	1911*	Western....	23,914 70	
Total.....					\$173,316 97

* And amendatory laws.

Bridge Designers, Engineers, etc.

WORK	ACT		Division	Amount	Total
	Chap.	Year			
Bridge designers, engineers, etc....	181	1917	Eastern	\$1,969 58	\$1,969 58

Special Work

WORK	Act		Division	Amount	Total	
	Chap.	Year				
High street bridge, Cohoes.....	181	1917	Eastern....	\$158 84	\$181 62	
Sea-wall, Orient Point, L. I.	428	1918	Eastern....	22 78		
Yorkville bridge.....	752	1917	Middle....	\$309 55		
Whiteboro street bridge, Rome....	753	1917	Middle....	60 75	3,617 05	
Lyons Falls bridge.....	246	1913	Middle....	398 96		
	699	1915				
	728	1915				
Cowaselon creek improvement.....	781	1917	Middle....	980 85		
Limestone creek improvement.....	751	1917	Middle....	182 06		
Minetto bridge.....	716	1915	Middle....	1,532 48		
Canandaigua lake dredging.....	756	1917	Middle....	152 40		
Canistota river improvement.....	750	1913	Western....	\$41 27		
	728	1915				
	181	1917				
Chadakoin river improvement.....	758	1913	Western....	1,181 86		
	728	1915				
	181	1917				
Ellicott creek improvement.....	624	1913	Western....	63 68		
	728	1915				
	181	1917				
Hertel avenue bridge, Buffalo.....	760	1917	Western....	474 22		
Eighteen-Mile creek culvert, Lockport.....	761	1917				
	181	1917	Western....	133 79		
	626	1917			1,894 82	
Total.....					\$5,693 49	

Special Surveys

WORK	ACT		Division	Amount	Total
	Chap.	Year			
Blue line surveys.....	181	1917	Eastern.....	\$28,275 78	\$44,500 20
Location of bridge between Crescent and Rexford.....	742	1917	Eastern.....	399 00	
Schenectady-Sootia bridge.....	735	1917	Eastern.....	11,493 54	
State boundary line.....	181	1917	Eastern.....	1,316 49	
Delaware-Schoharie county boundary line.....	151	1918	Eastern.....	624 45	
Saratoga-Warren county boundary line.....	559	1918	Eastern.....	523 20	
Hydrographic survey.....	561	1918	Eastern.....	1,867 74	
Blue line surveys, Erie canal.....	181	1917	Middle.....	\$11,812 83	
Blue line surveys, Oswego canal.....	181	1917	Middle.....	1,515 18	
Surveys for State Court of Claims, Erie canal.....	181	1917	Middle.....	1,587 71	
Surveys for State Court of Claims, Black River canal.....	181	1917	Middle.....	301 01	23,575 94
Surveys for Barge canal extension to Auburn.....	376	1917	Middle.....	8,359 21	
Blue line surveys.....	181	1917	Western.....	\$1,005 67	
Surveys for State Court of Claims, Tonawanda creek survey, Batavia.....	181	1917	Western.....	2,000 00	
Study of route of improved Erie canal between Tonawanda and Buffalo.....	453	1917	Western.....	1,650 00	8,892 78
	743	1917	Western.....	4,237 11	
Total.....					\$76,968 92

*Summary of Engineering Expenses for the Fiscal Year Ended
June 30, 1918*

DIVISION	Ordinary repairs to canals	Construction of Barge canal	Construction of Barge canal, terminals	Bridge designers, engineers, etc.	Special work	Special surveys	Total
Eastern and head office..	\$11,812 00	\$325,378 09	\$128,037 62	\$1,969 58	\$181 62	\$44,500 20	\$511,879 11
Middle.....	9,964 88	115,948 02	21,864 65	.....	3,617 05	23,575 94	174,470 54
Western.....	10,000 00	171,566 55	23,914 70	.....	1,894 83	8,892 78	216,268 85
Totals.....	\$31,776 88	\$612,892 66	\$173,816 97	\$1,969 58	\$5,693 49	\$76,968 92	\$902,618 50

TABLE OF CONTRACTS COMPLETED DURING THE FISCAL YEAR ENDED JUNE 30, 1918
Special Work

CONTRACTOR	Date of contract	Character of work	Division	Act		Appropriation	Engineer's preliminary estimate	Contract price as modified by alterations	Final payment
				Chap.	Year				
Walker S. Rae.....	Oct. 25, 1915	Continuing and completing construction of bridge over Black and Moose rivers at Lyons Falls, Lewis county.....	Middle...	{ 609 1915 } { 728 1915 } { 646 1918 }		*\$67,838 44	\$59,385 00	\$61,719 40	\$56,772 28
A. M. Hasell, Inc.....	Aug. 16, 1917	Repairing timber bulkhead at highway adjacent to U. S. fort, Rockaway Point.....	Eastern..	130	1917	†	38,465 50	40,835 35	39,949 31

* This figure includes \$37,838.44 reappropriated from the unexpended balance from chapter 246, Laws of 1913, and a new appropriation of \$30,000.00.

† Work done under an act which, in addition to making provisions for the acquisition of land, appropriated \$100,000.00 for highway improvement, for purposes of public defense.

Construction of the Barge Canal
Chapter 147, Laws of 1903; chapter 391, Laws of 1909; and amendatory laws

CONTRACTOR	Date of contract	Character of work	Division	Engineer's preliminary estimate	Contract price as modified by alterations	Final payment
A. A. Parker.....	Oct. 17, 1916	Contract No. 2-G, Erie canal — Spillway, Taintor gate and operating equipment. Waterford side-cut.	Eastern.....	\$9,686 00	\$11,769 85	\$11,589 50
Mohawk Dredge & Dock Co., Inc.....	Nov. 24, 1916	Contract No. 30-A, Erie canal — Completing the canal from Jacksonburg to Herkimer.	Eastern.....	122,013 00	128,837 20	124,460 85
The M. A. Talbott Co.....	Oct. 15, 1909	Contract No. 43, Erie canal — Oriskany road to Nud creek.	Middle.....	1,529,885 00	1,388,080 05	1,281,571 54
James Stewart & Co., Inc.....	Sept. 2, 1914	Contract No. 40-A, Erie canal — Fox Ridge to Montezuma aqueduct.	Middle.....	333,941 50	196,133 50	180,438 93
Alto Construction Co.....	Dec. 23, 1910	Contract No. 51, Water-supply — Feeder from Trenton Falls on West Canada creek to Nine-Mile creek.	Middle.....	424,710 00	414,869 85	360,607 46
P. H. Murray.....	July 3, 1916	Contract No. 59-A, Erie canal — Sewer from Genesee Valley park, Rochester.	Western.....	124,260 55	110,689 45	109,996 85
Central Dredging Co.....	Oct. 22, 1912	Contract No. 70-A, Champlain canal — Hudson river, Waterford to lock No. 1.	Eastern.....	790,488 00	759,158 88	789,561 62
James Stewart & Co., Inc.....	July 7, 1916	Contract No. 72-B, Champlain canal — Widening prism at mouth of Hoosic river.	Eastern.....	207,700 00	108,540 00	92,516 58
Dunbar & Sullivan Dredging Co.....	Feb. 13, 1914	Contract No. 74, Erie canal — Hudson river and Mohawk river at Waterford.	Eastern.....	256,372 00	240,872 00	215,741 49
Chesley, Earl & Heimbach, Inc.....	Oct. 17, 1916	Contract No. 81, Erie canal — Junction lock at Rome.	Middle.....	61,236 40	54,685 90	49,206 89
Lord Construction Co.....	Nov. 24, 1916	Contract No. 91-A, Erie canal — New governor equipment for hydro-electric power-plant at Crescent dam.	Eastern.....	6,310 00	5,630 00	5,926 10
Holler & Shepard.....	May 27, 1916	Contract No. 128, Champlain canal — Highway bridge at Northumberland.	Eastern.....	77,751 50	76,486 70	74,591 29
The Foundation Co.....	June 6, 1916	Contract No. 129, Erie canal — Freeman's bridge, range towers, beacons, etc.	Eastern.....	80,976 50	89,900 80	82,201 62
Lupfer & Remick.....	Nov. 3, 1916	Contract No. 132, Erie canal — Lighthouses.	Eastern.....	63,937 00	70,267 80	69,669 29
Morrison & Quinn, Inc.....	Oct. 16, 1916	Contract No. 133, Erie canal — Junction lock at Mohawk.	Middle.....	47,534 00	48,638 80	39,203 20
Great Lakes Dredge & Dock Co.....	Sept. 18, 1916	Contract No. 135, Erie canal — Widening the prism at Canajoharie.	Eastern.....	78,052 00	57,038 00	48,637 34
J. A. Laporte.....	Oct. 13, 1916	Contract No. 137, Erie canal — Sheet-piling at dam No. 10, Canajoharie.	Eastern.....	25,333 00	22,650 00	17,041 90
Empire Engineering Co., Inc.....	Nov. 3, 1916	Contract No. 139, Oswego canal — Lock No. 8 to deep water in Lake Ontario.	Middle.....	25,280 00	25,912 00	17,836 64
Brown & Lowe Co.....	Dec. 1, 1916	Contract No. 150, Erie canal — Apron below head-gates at Vischer Ferry dam.	Eastern.....	20,300 00	21,780 00	22,273 00

REPORT OF STATE ENGINEER

TABLE OF CONTRACTS COMPLETED DURING THE FISCAL YEAR ENDED JUNE 30, 1918 — (Continued)
Construction of the Barge Canal — (Continued)

CONTRACTOR	Date of contract	Character of work	Division	Engineer's preliminary estimate	Contract price as modified by alterations	Final payment
R. B. Wing & Son.....	Feb. 28, 1917	Contract No. 153, Erie and Oswego canals — Buoy, stake and bridge lanterns on the Mohawk, Oneida, Seneca and Oswego rivers.....	Eastern and Middle.....	\$4,200 00	\$4,389 00	\$4,389 00
Lupfer & Remick.....	April 7, 1917	Contract No. 154, Erie canal — Additional Taintor gate, lock No. 27, Lyons.....	Western.....	7,802 70	8,552 50	8,409 30
Lupfer & Remick.....	Jan. 31, 1917	Contract No. 155, Erie canal — Hoists for bulkhead gates, Vischer Ferry dam.....	Eastern.....	9,998 00	11,586 00	11,327 86
Thomas Bowen.....	April 20, 1917	Contract No. 157, Erie canal — Dam across old Erie canal at Rome.....	Middle.....	4,924 00	6,247 50	5,890 22
Charles A. Ingersoll.....	Mar. 27, 1917	Contract No. 162, Erie canal — Drain at Main street, Brookport.....	Western.....	6,173 90	7,208 30	6,455 72
Holler & Shepard.....	June 28, 1917	Contract No. 169, Champlain canal — Temporary cribs below locks Nos. 3 and 6.....	Eastern.....	3,508 00	3,066 00	2,882 53
R. B. Wing & Son.....	Feb. 9, 1918	Contract No. 173, Erie canal — Buoy, stake and bridge lanterns on the Seneca, Clyde, Genesee and Tonawanda rivers.....	Middle and Western.....	9,500 00	8,960 00	8,960 00
W. F. Martens.....	Mar. 12, 1918	Contract No. 178, Erie canal — Additional protection in by-passes at locks Nos. 32 and 33.....	Western.....	41,706 00	49,844 00	47,271 62
The Sherman-Stalter Co.....	July 24, 1916	Contract A-1, Cayuga and Seneca canal — Fish-ladder and repairs to dam No. 1.....	Middle.....	29,019 30	26,842 50	24,749 82
Stanley Construction Co.....	July 20, 1914	Contract F, Cayuga and Seneca canal — Free, Demont's and Lake road bridges.....	Middle.....	126,263 00	142,578 70	127,369 75
Scott Brothers.....	Sept. 23, 1915	Contract L, Cayuga and Seneca canal — Bridges at Gorham street and Kingdom road.....	Middle.....	71,469 25	59,928 40	58,549 16
The Foundation Co.....	June 8, 1917	Contract P, Cayuga and Seneca canal — Concrete cut-off wall under lock No. 5.....	Middle.....	76,412 50	82,850 00	98,372 32

Special Work Connected with Barge Canal Construction

CONTRACTOR	Date of contract	Character of work	Division	Engineer's preliminary estimate	Contract price as modified by alterations	Final payment
American Pipe & Construction Co.	April 2, 1917	Erie canal — Completing work on contract No. 20-D that had been added by alterations	Eastern			\$64,815 90
Harry A. Schaupp	Jan. 17, 1916	Erie canal — Connecting highways, Musk road to James street and Whitesboro street to Mill street, Rome	Middle	\$28,634 55	\$32,111 15	31,730 24
Lackawanna Bridge Co.	Jan. 24, 1914	Erie canal — Furnishing and placing machinery in guard-lock on contract No. 21	Western			4,873 91

REPORT OF STATE ENGINEER

TABLE OF CONTRACTS COMPLETED DURING THE FISCAL YEAR ENDED JUNE 30, 1918 — (Concluded)
Construction of Barge Canal Terminals
 Chapter 746, Laws of 1911, and amendatory laws

CONTRACTOR	Date of contract	Character of work	Division	Engineer's preliminary estimate	Contract price as modified by alterations	Final payment
Kender Engineering & Construction Co., Inc.	Dec. 29, 1914	Terminal contract No. 13 — Guard-lock, highway bridge and cut-off dam at Schuylerville.	Eastern	\$61,664 60	\$42,742 80	\$38,190 00
Mohawk Dredge & Dock Co., Inc.	Aug. 13, 1917	Terminal contract No. 15-D — Drainage system at the Utica terminal.	Middle	8,200 00	8,980 00	8,863 29
E. Brown Baker	June 4, 1917	Terminal contract No. 16-P — Paving terminal at Rome.	Middle	3,800 00	3,909 50	4,168 50
H. S. Kerbaugh, Inc.	July 10, 1914	Terminal contract No. 33 — Terminal pier, channels, etc., at the east end of West First street, Oswego.	Middle	415,420 00	351,175 50	333,388 36
Fred H. Rhoady	Mar. 29, 1917	Terminal contract No. 39 — Terminal at Albion.	Western	2,700 00	2,983 50	2,718 00
Scott Brothers	Sept. 20, 1915	Terminal contract No. 40 — Dockwall and harbor at St. Johnsville.	Eastern	27,963 00	27,762 37	25,542 91
Hammond-Tracey Construction Co., Inc.	Mar. 27, 1917	Terminal contract No. 54 — Terminal at Middleport.	Western	1,250 00	1,234 00	1,063 25
Kennedy & Scullen	Mar. 12, 1917	Terminal contract No. 204 — Temporary terminal warehouses at Schenectady, Amsterdam, Fonda, Ilion and Frankfort.	Eastern	4,765 00	119,000 00	19,023 35
William R. Kimmey	Mar. 14, 1917	Terminal contract No. 205 — Temporary terminal warehouses at Utica and Rome.	Middle	2,320 00	113,906 75	13,530 55
Kennedy & Scullen Construction Co.	May 7, 1917	Terminal contract No. 208 — Temporary terminal warehouses at Fort Plain and Little Falls.	Eastern	9,140 00	9,278 76	9,280 18
G. J. and P. L. Metzger	June 4, 1917	Terminal contract No. 209 — Frame warehouses at Tonawanda and North Tonawanda.	Western	7,892 00	7,535 00	7,450 10
Savage Construction Co.	June 1, 1917	Terminal contract No. 210 — Frame warehouses at upper and lower terminal sites at Lockport.	Western	9,955 00	9,903 00	9,765 00
W. F. Martens & Co., Inc.	June 14, 1917	Terminal contract No. 211 — Frame warehouses at Newark, Albion and Medina.	Western	8,800 00	8,002 00	7,896 80

* Terminal contract No. 13 was suspended by the Canal Board February 23, 1916. The work on this contract has all been done by the Superintendent of Public Works. The amount, \$38,190.00, is based on the last estimate of work done, at contract prices.

† The warehouses under contracts Nos. 204 and 205 were all increased in size by alterations to the contracts. For this reason the contract price of each was increased considerably.

TABLE OF CONTRACTS PENDING

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TABLE OF CONTRACTS PENDING JUNE 30, 1918
Special Work

CONTRACTOR	Date of contract	Character of work	Division	Act		Appropriation	Engineer's preliminary estimate	Contract price as modified by alterations	Value of work done to June 30, 1918
				Chap.	Year				
Rosoff Engineering Co.....	June 12, 1918	Constructing a concrete pavement on State reservation, Rockaway Point.....	Eastern...	130	1917	*	\$35,995 00	\$46,126 25	\$0 00
A. M. Hasell, Inc.....	Jan. 3, 1918	Repairs to landing pier, Quarantine station, Hoffman island, New York harbor.....	Eastern...			†		3,387 00	3,320 00
Anderson & Wheeler.....	June 26, 1918	Repairs to north pier, Quarantine station, Hoffman island, New York harbor.....	Eastern...			†			0 00
Walter S. Rae.....	Oct. 25, 1917	Constructing a steel bridge over the Black River canal at E. Whitesboro St., Rome.....	Middle...	753	1917	\$15,000 00	12,085 00	11,883 00	0 00
Robert Provo.....	Nov. 30, 1917	Dredging and improvement of Cowaselon creek, between Canastota and Lakeport.....	Middle...	781	1917	12,000 00	10,420 00	10,380 00	0 00
Larkin & Sangster.....	Sept. 12, 1916	For constructing portions of a bridge over the Oswego river at Minetto. (Part of Barge canal contract No. 99).....	Middle...	{ 716 1915 181 1917 }		50,000 00	44,088 15	42,988 15	30,040 00
W. F. Martens.....	May 6, 1918	Dredging harbor and repairing pier and breakwater at Canandaigua.....	Middle...	756	1917	16,500 00		15,097 00	0 00
Russell R. Ames.....	Jan. 30, 1918	Constructing a concrete culvert over Eighteen-Mile creek, Lockport.....	Western...	626	1917	12,500 00	10,805 00	11,236 00	340 00
J. W. Hennessy, Inc.....	April 18, 1918	Improvement of Ellicott creek, Erie county over the old Erie canal at Hertel avenue, Buffalo.....	Western...	{ 760 1917 181 1917 }		88,711 38	83,803 25	86,885 30	0 00
Lupier & Remick.....	Mar. 15, 1918	Improvement of a steel through-truss bridge over the old Erie canal at Hertel avenue, Buffalo.....	Western...	{ 761 1917 758 1913 }		30,000 00	27,937 50	27,967 20	5,750 00
Geo. L. Malkby.....	Mar. 23, 1916	Improvement of Chadakoin river, Chautauqua county.....	Western...	{ 728 1915 }		100,000 00	89,252 25	92,074 25	8,570 00

* Work done under an act which, in addition to making provision for the acquisition of land, appropriated \$100,000.00 for highway improvement, for purposes of public defense.
† These contracts have been prepared and the work is being supervised by this Department for the Health Officer of the port of New York. The funds are available from appropriations for the use of this officer.

TABLE OF CONTRACTS PENDING JUNE 30, 1918 — (Continued)
Construction of the Barge Canal
 Chapter 147, Laws of 1903; chapter 391, Laws of 1909; and amendatory laws

CONTRACTOR	Date of contract	Character of work	Division	Engineer's preliminary estimate	Contract price as modified by alterations	Value of work done to June 30, 1918
Holler & Shepard.....	Aug. 31, 1914	Contract No. 1-A, Champlain canal — Hudson river, Northumberland to Fort Miller and Crocker's Reef to Port Edward.....	Eastern.....	\$90,811 00	\$141,540 20	\$193,530 00
Empire Engineering Co., Inc.....	Nov. 3, 1916	Contract No. 19-A, Erie canal — Reddressing contract No. 19 and incidental work.....	Western.....	152,200 00	169,750 10	142,820 00
Walsh Construction Co.....	Feb. 16, 1916	Contract No. 21-A, Erie canal — Completing canal, 400 feet west of Genesee river to N. Y. C. R. R. crossing.....	Western.....	415,700 00	428,475 54	393,990 00
Empire Engineering Co., Inc.....	May 20, 1916	Contract No. 23-A, Erie canal — Completing canal, King's Bend to Genesee river.....	Western.....	651,703 10	745,672 42	461,810 00
Eastover Construction Co., Inc.....	Mar. 27, 1916	Contract No. 29-A, Erie canal — Completing canal, Sterling creek to Herkimer-Oneida county line.....	Eastern.....	162,005 00	318,650 70	298,520 00
Grant Smith & Co., & Locher.....	Feb. 24, 1913	Contract No. 42-A, Erie canal — Herkimer-Oneida county line to Oriskany road.....	Middle.....	1,033,037 85	1,239,045 03	1,194,050 00
Scott Brothers.....	Oct. 10, 1916	Contract No. 44-A, Erie canal — Prism near junction lock at New London.....	Middle.....	57,030 00	52,480 00	45,970 00
Scott Brothers.....	Feb. 25, 1916	Contract No. 46-B, Erie canal — Lock, dam, etc., at May's Point.....	Middle.....	314,660 72	293,676 97	258,760 00
MacArthur Bros. Co.....	Nov. 3, 1916	Contract No. 59, Erie canal — Constructing canal between contracts Nos. 21-A and 23-A at Genesee river, and Rochester harbor.....	Western.....	1,675,252 86	1,603,285 11	413,460 00
Great Lakes Dredge & Dock Co.,...	Jan. 15, 1916	Contract No. 73-A Champlain canal — Completing the canal from Northumberland to Stillwater.....	Eastern.....	432,045 00	506,169 67	447,430 00
Mohawk Dredge & Dock Co.,...	Oct. 22, 1917	Contract No. 83, Erie canal — Completing the canal at Tonawanda and other work near Sulphur Springs.....	Western.....	149,604 50	216,615 00	55,200 00
Lupier & Remick.....	Mar. 9, 1917	Contract No. 84, Erie canal — Viaduct over Clyde river at Clyde.....	Western.....	83,984 50	83,876 66	37,300 00
The Hollington Co.,...	Jan. 5, 1911	Contract No. 91, Erie canal — Hydro-electric power-plant at Crescent dam.....	Eastern.....	44,600 00	44,985 50	43,710 00
Tift Construction Co., Inc.....	Nov. 24, 1916	Contract No. 98, Erie canal — Adams street lift-bridge, Lockport.....	Western.....	77,496 60	82,426 25	73,690 00
Larkin & Sangster.....	Sept. 12, 1916	Contract No. 99, Oswego canal — Bridge over Oswego river at Minetto.....	Middle.....	172,962 60	173,082 60	156,960 00
Walter S. Rae.....	April 15, 1918	Contract No. 117, Oswego canal — Bridge over lock No. 2, Fulton.....	Middle.....	34,713 30	36,513 80	0 00
Chesley, Earl & Heimbach, Inc.....	Mar. 8, 1917	Contract No. 122-A, Erie canal — Completing highway bridge near Little Falls.....	Eastern.....	52,717 00	67,377 00	37,130 00

TABLE OF CONTRACTS PENDING

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M. Fitzgerald.....	Mar. 5, 1917	Contract No. 131-A, Champlain canal — Completing portions of a highway bridge at Schuylerville.....	Eastern.....	30,753 00	39,634 50	36,880 00
Combined Construction Co.....	April 19, 1917	Contract No. 138, Erie canal — Movable dam, etc., at Rochester.....	Western.....	302,700 30	321,115 12	20,200 00
W. F. Mass & Son.....	Mar. 8, 1917	Contract No. 141, Erie canal — Power-station at lock No. 29, Palmyra.....	Western.....	41,166 50	41,180 75	11,760 00
W. F. Martens & Co., Inc.....	June 14, 1917	Contract No. 144, Erie canal — Two concrete bridges over Red creek, Genesee Valley park, Rochester.....	Western.....	41,480 70	41,258 70	5,740 00
Peckham Construction Co., Inc.....	April 18, 1918	Contract No. 146, Erie canal — Movable dam at Herkimer.....	Eastern.....	81,726 20	93,769 40	180 00
Lathrop, Shea & Henwood Co.....	Sept. 10, 1917	Contract No. 147, Erie canal — Lift-bridge between Tonawanda and North Tonawanda.....	Western.....	227,032 80	233,986 30	30,530 00
Lathrop, Shea & Henwood Co.....	Sept. 5, 1917	Contract No. 148, Erie canal — Highway bridge at Leach street, Lyons.....	Western.....	65,810 60	66,986 20	7,270 00
Chesley, Earl & Heimbach, Inc.....	Aug. 28, 1917	Contract No. 156, Erie canal — Highway bridge near Sylvan Beach.....	Middle.....	7,788 00	10,113 00	2,510 00
I. M. Ludington's Sons, Inc.....	Mar. 27, 1917	Contract No. 159, Erie canal — Extending Canarus creek spillway and raising canal banks nearby.....	Western.....	30,464 00	43,258 50	33,660 00
Lord Construction Co.....	Aug. 3, 1917	Contract No. 161, Erie canal — Electric motors and machinery for guard-locks at Rochester.....	Western.....	5,972 00	15,867 35	9,040 00
Lathrop, Shea & Henwood Co.....	Oct. 30, 1917	Contract No. 164, Erie canal — Completing canal between Lyons and Newark and retaining dam at Macedon.....	Western.....	124,313 00	159,848 25	81,980 00
Mohawk Dredge & Dock Co., Inc.....	Nov. 23, 1917	Contract No. 165, Erie canal — Removing Montezuma aqueduct.....	Middle.....	84,530 00	160,943 00	116,680 00
Walter S. Rae.....	Oct. 13, 1917	Contract No. 167, Oswego canal — Bascule bridge at Culver street, Phoenix.....	Middle.....	26,653 60	29,689 30	1,000 00
Cleveland & Sons Co.....	Nov. 10, 1917	Contract No. 170, Erie canal — Junction lock at South Greece.....	Western.....	54,800 50	64,942 50	44,060 00
Lupfer & Remick.....	Mar. 25, 1918	Contract No. 172, Erie canal — Barrel buoys and lamp posts on the Seneca, Clyde, Genesee and Tonawanda rivers.....	Middle and Western.....	14,853 00	12,921 45	11,220 00
I. M. Ludington's Sons, Inc.....	Nov. 9, 1917	Contract No. 179, Erie canal — Completing the canal at railroad crossings near Pittsford.....	Western.....	76,033 50	84,092 20	62,190 00
Dunbar & Sullivan Dredging Co.....	Mar. 15, 1918	Contract No. 180, Erie canal — Removing part of aqueduct at Rexford Flats.....	Eastern.....	17,840 00	15,958 00	15,810 00
Law Brothers.....	Dec. 28, 1917	Contract No. 181, Erie canal — Lining and water-proofing prism at Little Falls.....	Eastern.....	46,624 00	54,694 00	47,370 00
Mohawk Dredge & Dock Co., Inc.....	April 12, 1918	Contract No. 184, Erie canal — Excavating under N. Y. C. R. R. bridge at Brewerton.....	Middle.....	7,200 00	9,480 00	9,400 00
Robert Wetherill, Receiver, American Pipe & Construction Co.....	June 24, 1918	Contract No. 185, Erie canal — Improving river channel below dams at Scotia and Rotterdam.....	Eastern.....	230,550 00	154,395 00	0 00
Lupfer & Remick.....	Nov. 5, 1914	Contract M, Cayuga and Seneca canal — Electrical and operating equipment for locks Nos. 1, 2, 3 and 4.....	Middle.....	176,087 00	191,436 00	186,100 00
The Sherman-Stalter Co.....	April 30, 1918	Contract R, Cayuga and Seneca canal — Completing work at several locations.....	Middle.....	185,259 00	180,122 80	15,170 00

† These figures do not include the portion of this contract under chapter 746, Laws of 1915. See "Special Work."

TABLE OF CONTRACTS PENDING JUNE 30, 1918 — (Continued)
Special Work Connected with Barge Canal Construction

CONTRACTOR	Date of contract	Character of work	Division	Engineer's preliminary estimate	Contract price as modified by alterations	Value of work done to June 30, 1918
The Sherman-Stalter Co.....	Mar. 27, 1917	Erie canal — Completing contract No. 47-A, east line of Wayne county to Lyons.....	Western.....	.....	.....	\$911,107 16
Superintendent of Public Works.....	Erie canal — Completing contract No. 63-A, west line of Wayne county to King's Bend.....	Western.....	335,025 44

TABLE OF CONTRACTS PENDING

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Construction of Barge Canal Terminals Chapter 746, Laws of 1911, and amendatory laws

CONTRACTOR	Date of contract	Character of work	Division	Engineer's preliminary estimate	Contract price as modified by alterations	Value of work done to June 30, 1918
James P. Kelly.....	April 15, 1918	Terminal contract No. 8-P — Paving terminal at Schenectady	Eastern.....	\$8,400 00	\$8,400 00	\$1,000 00
Patrick W. Mulderry.....	April 12, 1918	Terminal contract No. 10-P — Paving terminal at Fond du Lac	Eastern.....	8,602 00	8,700 00	0 00
Anchor Post Iron Works.....	April 16, 1918	Terminal contract No. 12-F — Fence at the Amsterdam terminal	Eastern.....	1,289 00	1,379 50	0 00
Lupfer & Remick.....	Oct. 31, 1917	Terminal contract No. 15-M — Electrical equipment for the Utica terminal	Middle.....	30,081 20	36,987 50	7,140 00
McHarg-Barton Co.....	Nov. 24, 1916	Terminal contract No. 19 — Dredging and constructing bulkhead wall and pier, and repairing two piers and a bulkhead at Greenpoint	Eastern.....	193,500 00	211,513 00	131,450 00
Walsh Construction Co., Inc.....	Nov. 4, 1915	Terminal contract No. 20 — Terminal basin with connecting channel to Onondaga lake at Syracuse	Middle.....	665,875 00	566,763 26	513,680 00
H. S. Kerbaugh, Inc.....	Jan. 12, 1914	Terminal contract No. 21 — Harbor, piers, bulkheads, etc., in Erie basin, Buffalo	Western.....	1,513,925 00	797,772 30	642,080 00
Henry P. Burgard Co.....	May 6, 1918	Terminal contract No. 21-P — Paving part of terminal at Erie basin, Buffalo	Western.....	14,180 00	14,350 00	370 00
John E. Byron & Co.....	Oct. 30, 1916	Terminal contract No. 26 — Dredging and constructing pier at Rouses Point	Eastern.....	51,200 00	55,678 50	18,730 00
Patrick W. Mulderry.....	April 12, 1918	Terminal contract No. 27-P — Paving terminal at Frankfort	Eastern.....	4,100 09	4,446 00	0 00
Barraley & Ingersoll.....	Feb. 15, 1915	Terminal contract No. 28 — Harbor, dockwall and breakwaters on Oneida lake at Cleveland	Middle.....	34,575 00	37,222 00	32,110 00
Barraley & Ingersoll.....	Nov. 27, 1914	Terminal contract No. 29 — Harbor, dockwall and breakwaters on Oneida lake at Constantia	Middle.....	43,573 50	39,793 50	3,400 00
Henry P. Burgard.....	Mar. 24, 1916	Terminal contract No. 30 — Dockwall and approach on east side of Oswego river at Oswego	Middle.....	103,700 00	106,166 70	96,160 00
Lupfer & Remick.....	Sept. 30, 1916	Terminal contract No. 31 — Terminal at Lyons	Western.....	57,925 00	51,653 80	32,050 00
Guy B. Dickson.....	May 27, 1918	Terminal contract No. 33-P — Paving part of terminal pier at Oswego	Middle.....	11,010 00	11,780 00	0 00
Holler & Shepard.....	Aug. 26, 1915	Terminal contract No. 37 — Dockwall and harbor at Canajoharie	Eastern.....	33,832 00	32,272 00	26,500 00
I. J. Stander & Co., Inc.....	Oct. 27, 1917	Terminal contract No. 38 — Constructing pier at West 53d street, North river, New York city	Eastern.....	259,000 00	265,503 16	51,490 00

TABLE OF CONTRACTS PENDING JUNE 30, 1918 — (Concluded)
Construction of Barge Canal Terminals — (Continued)

CONTRACTOR	Date of contract	Character of work	Division	Engineer's preliminary estimate	Contract price as modified by alterations	Value of work done to June 30, 1918
Geo. W. Rogers Co., Inc.	June 8, 1917	Terminal contract No. 44 — Terminal at Mott Haven.	Eastern	\$170,300 00	\$191,195 50	\$120,740 00
M. H. Ripton	Oct. 19, 1916	Terminal contract No. 48 — Terminal on east side of Genesee river at Rochester.	Western	101,000 00	93,828 00	79,900 00
Kaufman & Garvey	July 27, 1916	Terminal contract No. 52 — Terminal at Pier 6, East river, New York city.	Eastern	89,974 00	102,553 75	97,430 00
Walsh Construction Co.	Oct. 27, 1916	Terminal contract No. 53 — Terminal at Ohio basin, Buffalo.	Western	571,800 00	597,984 00	68,370 00
Riverside Contracting Co.	Sept. 4, 1917	Terminal contract No. 55 — Terminal at Gowanus bay, Brooklyn.	Eastern	513,000 00	508,400 75	157,330 00
I. J. Stapder & Co., Inc.	June 28, 1918	Terminal contract No. 56 — Repairing Pier 5, East river, New York city.	Eastern	20,400 00	27,159 60	0 00
W. F. Martens	May 6, 1918	Terminal contract No. 59 — Railroad approach to terminal pier at Oswego.	Middle	5,100 00	6,516 00	1,620 00
W. F. Martens	May 6, 1918	Terminal contract No. 60 — Railroad and crane tracks on terminal pier at Oswego.	Middle	8,365 00	9,660 00	3,410 00
Walsh Construction Co.	May 15, 1918	Terminal contract No. 61 — Railroad approach to pier 1, Erie basin, Buffalo.	Western	9,720 00	11,650 00	1,470 00
Walsh Construction Co.	May 15, 1918	Terminal contract No. 62 — Railroad and crane tracks on pier 1, Erie basin, Buffalo.	Western	8,470 00	11,400 00	0 00
H. W. Roberts & Co.	April 19, 1918	Terminal contract No. 63 — Railroad tracks and brick pavement on the terminal at Utica.	Middle	9,560 00	10,164 00	0 00
Robert Wetherill, Receiver, American Pipe & Construction Co.	April 24, 1918	Terminal contract No. 64 — Railroad and crane tracks on terminal at Schenectady.	Eastern	9,000 00	10,021 30	2,150 00
Empire Engineering Co., Inc.	June 29, 1918	Terminal contract No. 66 — Riprap at Erie basin, Buffalo.	Western	11,850 00	12,830 00	0 00
Mohawk Dredge & Dock Co., Inc.	Dec. 18, 1916	Terminal contract No. 101 — Stiff-leg derricks on terminal sites at Albany, Whitehall, Little Falls, Rome, Lockport and Tonawanda.	Eastern, Middle and Western	21,890 00	31,790 90	34,940 00
Brown Portable Conveying Machinery Co.	Oct. 3, 1917	Terminal contract No. 103-A — Two package-freight conveyors.	Eastern	7,800 00	8,200 00	0 00

TABLE OF CONTRACTS PENDING

63

Lord Electric Co.....	June 28, 1918	Terminal contract No. 105 — Installing electric wiring, lighting, power and battery-charging equipment, and auto-truck scales for Pier 6, East river, New York city	Eastern.....	17,742 40	16,000 50	0 00
The John F. Evers Machine Co. . .	Feb. 14, 1918	Terminal contract No. 106 — Fourteen two-ton tractor cranes for various terminals.....	Eastern, Middle and Western.....	73,500 00	77,210 00	40,130 00
J. A. Laporte.....	Jan. 2, 1917	Terminal contract No. 201 — Terminal warehouses at Albany and Whitehall.....	Eastern.....	59,300 00	65,174 85	23,770 00
I. J. Stander & Co., Inc.....	Jan. 11, 1918	Terminal contract No. 207 — Terminal freight-shed and head-house on Pier 6, East river, New York city.....	Eastern.....	133,500 00	128,250 01	0 00
Miller & Brady, Inc.....	Mar. 22, 1918	Terminal contract No. 207-H — Heating system in freight-shed on Pier 6, East river, New York city.....	Eastern.....	3,250 00	2,352 00	0 00
Jarcho Bros., Inc.....	April 16, 1918	Terminal contract No. 207-P — Plumbing and water supply system in freight-shed on Pier 6, East river, New York city.....	Eastern.....	6,000 00	6,650 00	0 00
Savage Construction Co.....	Feb. 14, 1918	Terminal contract No. 213 — Freight-house and four derricks at Syracuse.....	Middle.....	28,200 00	27,032 00	14,530 00
Kennedy & Scullen Construction Co. .	April 26, 1918	Terminal contract No. 214 — Freight-house and pavement at Amsterdam.....	Eastern.....	16,478 00	16,323 00	6,180 00

SUMMARY OF CONSTRUCTION WORK — BARGE CANAL AND TERMINALS
 Value of work done under Barge canal and terminal contracts, summarised by years and canals

YEAR*	BARGE CANAL					Oswego canal	Cayuga and Seneca canal	Terminals
	ERIE CANAL			Champlain canal				
	Eastern Division	Middle Division	Western Division					
1905	\$36,640	.....	\$59,190	\$71,620	.....	.....	.....	.....
1906	140,860	\$52,570	197,840	216,950	.....	\$2,220	.....	.....
1907	553,980	228,820	192,840	658,580	.....	69,010	.....	.....
1908	1,557,774	580,367	416,290	1,426,159	.....	173,030	.....	.....
1909	2,325,760	1,530,410	2,012,119	1,281,610	.....	324,090	.....	.....
1910	1,994,920	1,394,542	3,279,387	1,361,698	.....	529,890	.....	.....
1911	2,756,161	2,362,223	5,285,424	2,342,781	.....	1,075,556	\$432,050	.....
1912	2,128,787	1,802,231	6,390,375	1,070,702	.....	1,117,259	517,450	.....
1913	2,049,109	1,682,835	5,390,484	1,227,017	.....	1,427,058	845,810	.....
1914	2,593,664	2,079,604	72,334,353	2,039,534	.....	1,059,637	1,231,539	1,119,900
1915	2,996,147	1,146,418	476,377	1,240,491	.....	1,552,925	1,365,450	1,009,173
1916	1,312,713	250,385	412,226	1,406,928	.....	177,856	412,492	462,933
1917	1,277,160	\$580,240	1,179,508	573,694	.....	56,340	167,091	970,633
1918	412,967	385,468	2,673,153	254,523	.....	60,519	142,931	1,038,868
Totals	\$22,181,642	\$14,076,013	\$30,494,306	\$14,172,287	.....	\$6,625,360	\$5,134,813	\$5,150,619

Extra Work Orders Paid

1906	\$1,316	.....	.....	.....	.....	.....	.....	.....
1907	378	.....	.....	.....	.....	.....	.....	.....
1908	13,090	\$1,257	.....	.....	.....	.....	.....	.....
1909	37,141	50	\$300	\$50,738	.....	\$1,196	.....	.....
1910	12,866	329	10,464	23,854	.....	761	.....	.....
1911	22,102	12,388	10,662	1,001	.....	2,185	.....	.....
1912	34,957	3,833	173,859	14,834	.....	1,703	.....	.....
		2,899	94,956		.....		.....	.....

1913.....	76,860	11,101	203,577	34,810	8,415	\$2,065
1914.....	12,969	17,878	239,744	30,718	15,719	9,534
1915.....	19,731	11,334	20,954	11,090	4,130	2,926
1916.....	18,798	10,355	20,436	290	276	10,437
1917.....	12,689	3,714	8,893	1,844	10,217	14,134
1918.....	123,585	13,103	142,096	11,376	739	9,995
Totals.....	\$376,382	\$87,922	\$907,596	\$189,265	\$45,293	\$99,875
						\$61,324

* The years 1905 to 1915, inclusive, are twelve-month periods, ended September 30; 1916 is a nine-month period, ended June 30; 1917 and 1918 are twelve-month periods, ended June 30.

† In last year's report the special agreement on contract No. 21 was omitted. Work to the value of \$3,360 was done during 1914. The final account, amounting to \$4,873.91, was approved by the Canal Board May 1, 1918.

‡ This figure is less than was shown in last year's report because the final account on contract No. 43, which was not available last year, was less than the last monthly estimate then available to the extent of \$6,208.

NOTE.—This table includes work done under the supervision of this Department, excepting highways which were relocated or rebuilt. It includes all the Barge canal work shown in the four tables published in the *Barge Canal Bulletin* for July, 1918, except work to the value of \$30,040 done under contract No. 99, but payable from a special appropriation, and a sum of \$7,328 due to the difference between the last monthly estimate and the final account on contract No. 43.

Also the following items are included: Contract No. 20-D, work done by the Superintendent of Public Works, \$3,400; contract No. 20-D, special agreement for completing work which had been added by alterations, \$64,816; contract No. 21-A, special agreement for erecting steel and machinery on the guard-lock, \$4,874; contract No. 22, special agreement for supporting the Weedsport bridge, \$12,447; contract No. 25, special agreement for completing prism and placing wash wall, \$6,029; contract No. 47-A, work done by the Superintendent of Public Works, \$911,107; culvert No. 30 at crossing of Irondequoit creek, \$372,549; shelter at Delta dam, \$2,234; contract No. 63-A, work done by the Superintendent of Public Works, \$335,025; and two sums due to the difference between the last monthly estimate and the final account—\$189 on contract No. 154 and \$732 on contract No. 178.

This table also includes all the terminal work shown in the two tables published in the *Bulletin* before mentioned, and also the sum of \$448 due to the difference between the last monthly estimate and the final account on terminal contract No. 33. The remaining difference of one dollar is due to the odd cents on terminal contract No. 9.

REPORT

OF THE

DIVISION ENGINEER

OF THE

EASTERN DIVISION

For the Fiscal Year Ended June 30, 1918

EASTERN DIVISION

STATE OF NEW YORK
DEPARTMENT OF STATE ENGINEER AND SURVEYOR
EASTERN DIVISION

ALBANY, N. Y., July 1, 1918.

HON. FRANK M. WILLIAMS, *State Engineer and Surveyor,*
Albany, N. Y.:

Sir.—I have the honor of submitting herewith a report covering the work of the Eastern Division for the fiscal year ended June 30, 1918.

Mr. George D. Williams, Division Engineer, entered active military service on May 1, 1918, and it has been my privilege to carry on the work of the Division since that date.

The Barge canal construction has been progressed to a point near completion, and the portions within this Division have been open for barge navigation throughout the past year. Market conditions of labor and materials are such as to discourage the immediate construction of boats and there has not been the increase in boat tonnage which the condition of the canal would warrant. Some corporations with large bulk shipments have placed under commission boats constructed and equipped for their own class of freight. These, together with the operation of boats constructed for the old canals, have been sufficient to give the canal structures a thorough try-out.

In a system so extensive and with such a variety of structures, it is not surprising that some defects have developed. However, such defects as have been discovered are of a minor nature and have not interfered with navigation on the canals. It has been found necessary to reinforce the foundation of dam No. 5 and lock No. 9, at Rotterdam on the Erie canal. This work is being carried on without interrupting canal operation. Cross currents,

where dams are located in close proximity to locks, are causing some difficulty in the control of boats, especially fleets of barges under tow. It is proposed to construct guide cribs at the approaches of three locks on the Champlain canal, and a contract for that work has been prepared. Should this prove effective, the method should be extended to other locks.

During the winter season ice forms upon rock fragments, sunken logs, boulders and other bodies lying on the river bank or on the bottom and when the ice breaks up a portion of these are carried out and deposited within the canal channel. The Superintendent of Public Works has undertaken their removal, but the locating of them has, in general, been done by forces of this Department. This work requires nearly the full time of a field corps in sweeping channels and sounding to determine the nature and extent of obstructions, and in buoying their location and further sweeping, following their removal, to determine if the channel is entirely clear.

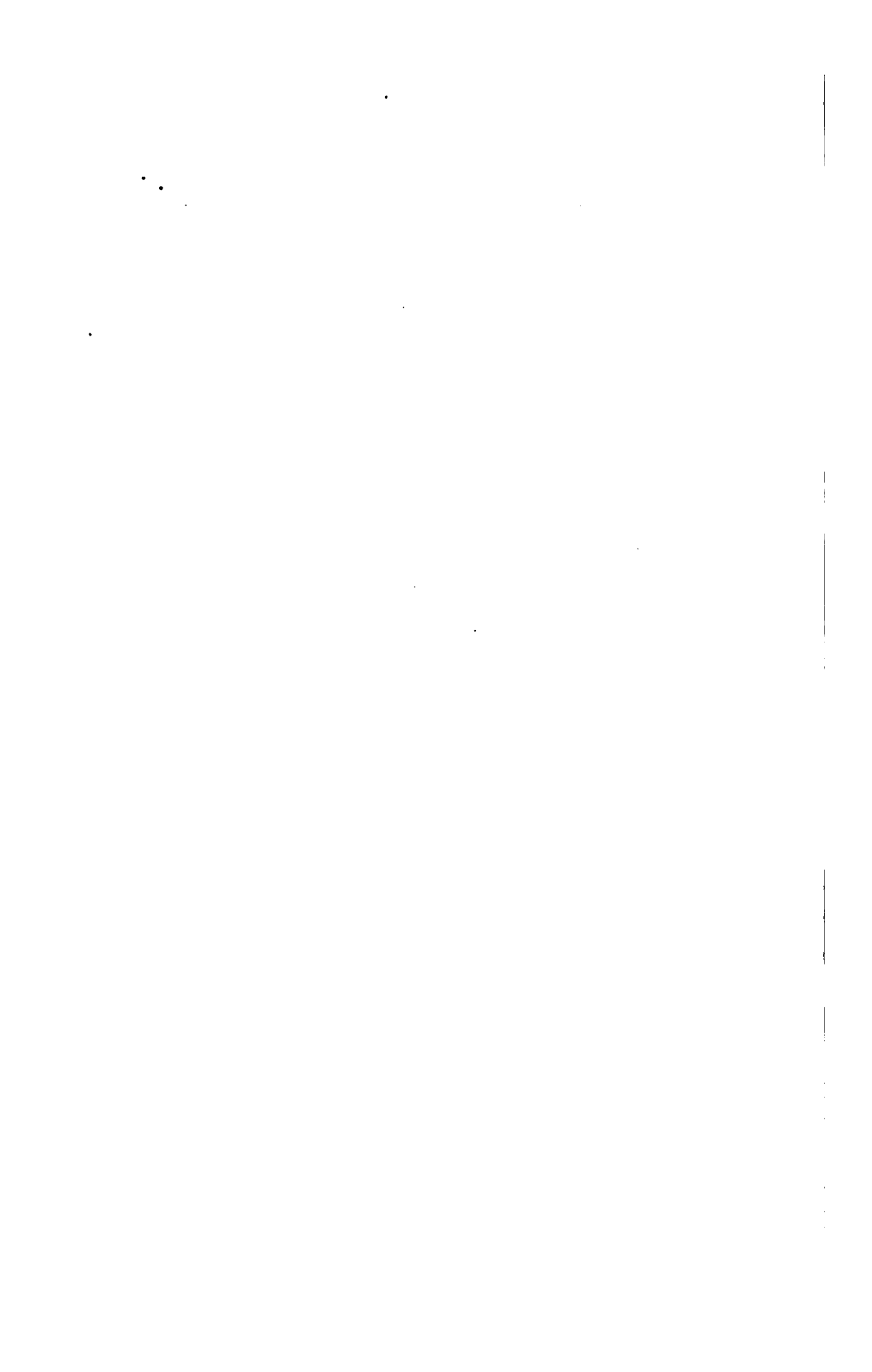
The deposit of material in the channel will be an annual occurrence, and in order that the Department may be in a position to investigate channel conditions, I would recommend that sweep-boats be provided, together with suitable power for towing them. The present sweeping outfits are of rather crude construction and not suitable for rapid work.

Where the canal is located in river sections, it is necessary to maintain offset base lines along the shore, in order that the exact location of the excavated channel may be retraced. This is required for the placing of buoys, sweeping of channel, etc. In order to have access to this line and protect the monuments upon it, I would recommend that, in releasing parcels on which the base line is located, a right of way be retained.

Many of the boats navigating the canal prefer to tie up rather than continue on their course during the night. The less seaworthy boats find it necessary to tie up during high stages of the river, or conditions unfavorable to navigation. For this purpose locks and approach walls are being used. I do not understand that such use is seriously interfering with navigation at present, but as the number of boats increases and more seaworthy ones are placed in commission, it may be necessary to provide mooring



EASTERN TERMINUS OF THE BARGE CANAL, ERIE BRANCH
Also the Barge canal terminal at Waterford, a wall built under canal construction serving as a dockwall.



places at points which will not obstruct the locks or approaches. I believe the subject should be investigated, so that this Department will be in a position to make a definite recommendation, should conditions require action.

CONSTRUCTION OF BARGE CANAL AND TERMINALS

During the fiscal year '27 Barge canal contracts have been active, and a portion of the Division force has been engaged in supervising them. A greater portion of the construction force has been employed on work in connection with the terminals. Dock facilities of various types have been under construction at ten locations, freight warehouses have been constructed at twelve terminals, and contracts have been entered into for various types of freight-handling equipment. The equipment under contract consists, principally, of self-propelled, or auto cranes, and fixed derricks. Contracts are being prepared for the installation of gantry cranes, and rail tracks for this type of crane are now under construction. In general, the freight-houses now built or under contract are of timber construction, and are so built as to be readily enlarged when the traffic demands. Several of them have been so crowded as to make the providing of additional facilities necessary, and contracts are now in force or are being prepared for extending the freight accommodations at Troy, Amsterdam, Little Falls, Herkimer and Canajoharie. Freight-houses at other terminals are being filled to capacity and extensions will be necessary. At Albany and Whitehall warehouses of steel and tile construction are under contract. A contract is now in force for the erection of a steel warehouse on Pier 6 at the mouth of East river, New York city.

Labor and material conditions have handicapped the contractors and construction has not progressed as rapidly as we have desired. I feel, however, that in general the contractors have made all reasonable efforts to progress the work and that such delays as have occurred were largely beyond their control.

Besides construction work in connection with the canals and terminals, this Department has made many investigations of alleged claims for damages; has coöperated with the Superintendent of Public Works in the removal of bars and obstructions; has investigated and reported on applications for reconveyance of

lands; has prepared release maps for lands no longer required, and has prepared maps for the appropriation of additional lands where construction made such appropriations necessary.

SPECIAL APPROPRIATIONS

In addition to the canal improvement, this Department has been employed in preparing plans and supervising contracts for work provided under special acts of the Legislature and in making miscellaneous surveys, maps, plans, etc., for other departments. A brief outline of such activities follows:

Blue Line Surveys

(Chapter 199, Laws of 1910, and amendatory laws)

The work of surveying and mapping old canal lands has been continued. Surveys for the Champlain canal are now complete except the Glens Falls feeder and that portion between Waterford and the junction with the Erie at Colonie, which is to be retained for use. Maps from this survey have been completed. Tracings have been made for about 50 per cent of the total length and tracings for the remaining portions are about 90 per cent complete.

On the Erie canal surveys are now complete from the easterly end of the canal to Mindenville, except for short distances in the vicinity of Fort Hunter and Randall. Surveys through the city of Little Falls are complete. The plotting of maps is well up with the survey work. If men are available, I hope to see these surveys completed during the next fiscal year.

Bulkhead and Roadway at Rockaway Point, L. I.

(Chapter 130, Laws of 1917)

Plans and estimates were prepared and the construction supervised for a timber bulkhead and filling of lands adjacent to the site of Fort Tilden at Rockaway Point, Long Island. Under the same chapter plans and specifications have been drawn for the construction of a concrete roadway along this fill.

Repairing Sea-walls, Orient Point, L. I.

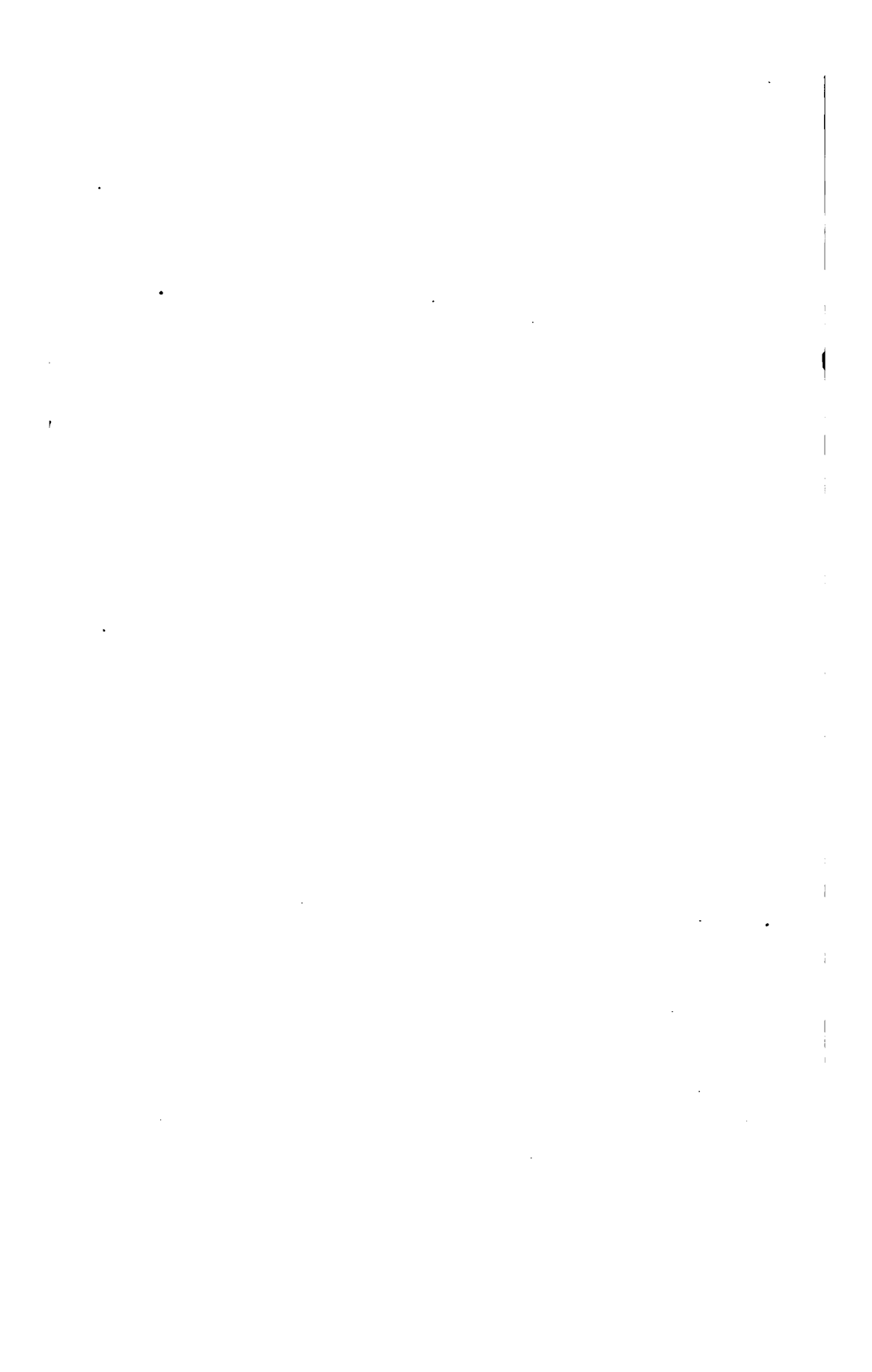
(Chapter 428, Laws of 1918)

Surveys have been made and plans, estimate and specifications prepared for repairing sea-walls at Orient Point, Long Island.



A GOVERNMENT CONCRETE BOAT PASSING THROUGH THE BARGE CANAL

This craft, built at Ithaca, made the passage of the canal just as the navigation season was closing. The view was taken at the foot of lock No. 2, just before the boat entered the Hudson river.



Jamaica Bay-Peconic Bay Canal Survey

(Chapter 317, Laws of 1917)

Surveys have been made and preliminary plans with estimate prepared of two routes through Rockaway peninsula, for the proposed Jamaica Bay-Peconic Bay canal.

Removal of High Street Bridge, Cohoes

(Chapter 181, Laws of 1917, and chapter 151, Laws of 1918)

Plans have been prepared and specifications drawn for the removal of the existing bridge over the old canal at High street, in the city of Cohoes, and the substitution of an earth fill. This work includes the regrading of the easterly approaches.

State Boundary Lines

Under chapter 181, Laws of 1917, surveys were made of the boundary line between New York state and the Dominion of Canada, extending from Fort Covington on the west to the New York-Vermont state line on the east. Surveys were also made of the New York and Pennsylvania state boundary line. The surveys consisted in examining the monuments and replacing such as were found to have been disturbed.

Schoharie-Delaware County Line Survey

(Chapter 559, Laws of 1919)

On June 10 a survey party was placed in the field to establish the boundary line between Schoharie county and Delaware county. This survey is now under way.

Boundary Line Survey Between Towns of Warrensburg and Luzerne, Warren County, and Between Warren and Saratoga Counties

(Chapter 561, Laws of 1918)

A survey party was organized for this work and began field work on June 18.

These last two surveys are under the supervision of R. S. Greenman, Senior Assistant Engineer. They will not be completed before the end of the summer season. Detailed report will be included with that for the fiscal year ending June 30, 1919.

Miscellaneous Surveys

The surveys, maps, plans, etc., made in coöperation with and at the request of other departments, include those of the armory sites at Troy and Malone; the Schuyler mansion at Albany; the proposed state office building site west of the Capitol at Albany; the Marcy State hospital near Utica; the State hospital at Middletown; the State hospital for the care of crippled and deformed children at West Haverstraw; a portion of Dannemora prison site; Craig Colony property at Sonyea; Wards Island, New York; the Wingdale prison site; and Kings Park hospital, Long Island; and surveys in connection with applications for grants of lands under water and also with foreclosures of U. S. Deposit Fund mortgages.

At Sonyea a topographic survey was made covering nearly the full site of 1,900 acres, the party being employed for about six months.

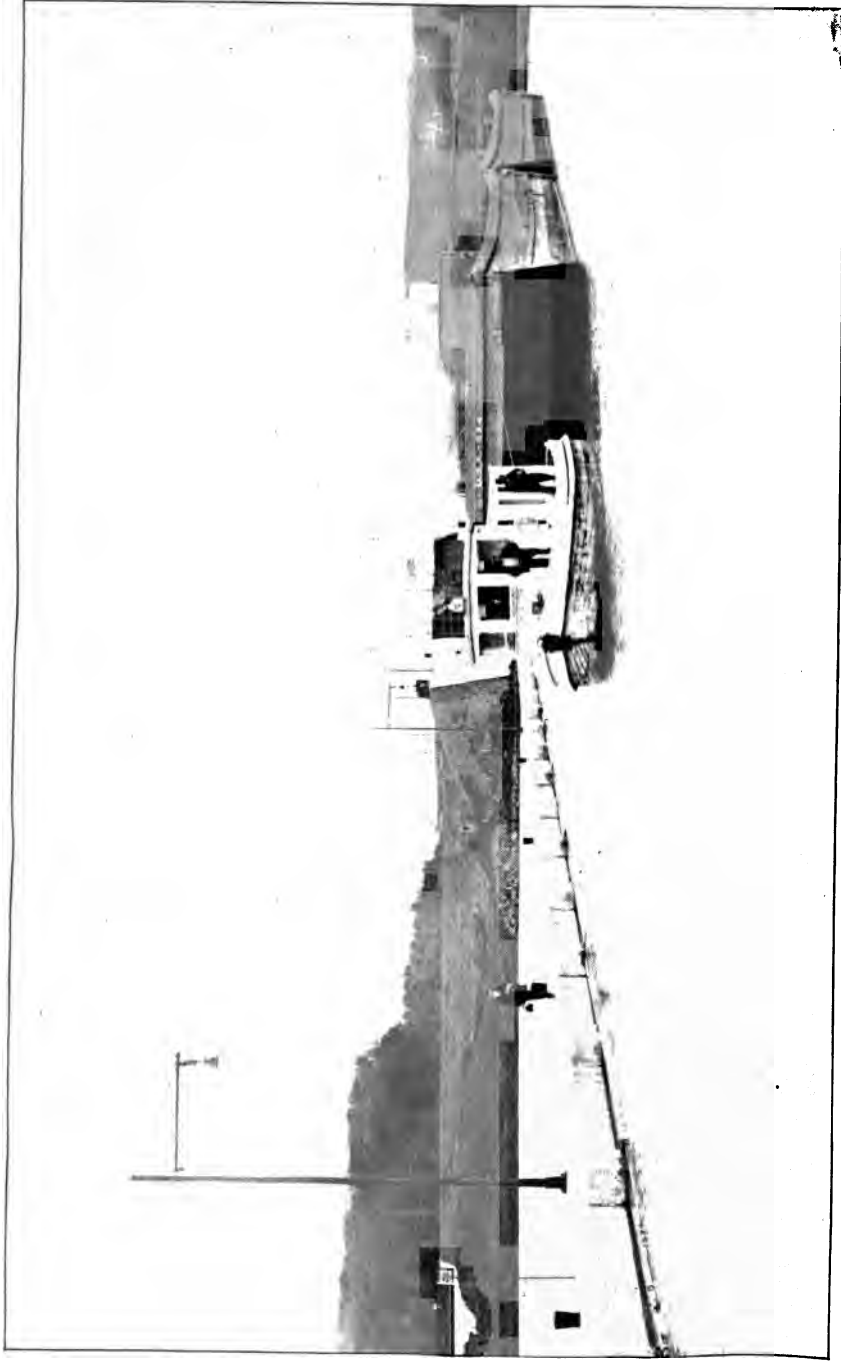
The work at Wingdale included investigations necessary for preparing plans for a dam and reservoir, and the supervision of the contract for grading the building areas.

Investigations have been made and plans are being prepared for a concrete reservoir at Kings Park hospital.

At Hoffman Island quarantine station repairs to the landing pier are being done under the supervision of this Department.

During the year considerable time has been devoted to surveys and maps in connection with applications for grants of lands under water. Investigations have been made and reports rendered for 21 parcels in the vicinity of New York city and 30 parcels up state, principally at Troy.

During the year 60 employees of this Division have entered active military service. The additional work thrown on the employees remaining has been cheerfully undertaken and faithfully performed. May I take this opportunity to express my appreciation of the assistance and advice which you and your deputies have given me and to commend to you the employees of the Division, who have loyally responded to the additional calls upon their time and energy.



GOVERNMENT BOATS PASSING THROUGH THE BARGE CANAL

These boats, which were built at a shipyard in central New York, were taken by canal for service in New York harbor.

Detail reports of the Senior Assistant Engineers in charge of the residencies into which the Division is divided, together with tabulations showing financial statements and disbursements are appended. In the Senior Assistant Engineers' reports will be found descriptions of the construction work done during the year.

Respectfully submitted,

L. C. HULBURD,

Senior Assistant Engineer in Charge.

APPENDED REPORTS—EASTERN DIVISION

ERIE CANAL, RESIDENCY No. 1

Assistant Engineer R. D. Hayes reports:

This residency extends from Albany to the site of the old lower Mohawk aqueduct.

Contracts Nos. 2-G, 74, and 91-A have been completed and work has progressed on terminal contract No. 36 and those portions of terminal contracts Nos. 101, 106 and 201 in this residency.

The preliminary survey for terminal contract No. 41, at upper Troy, was made during July, 1917.

At the Troy armory site a survey was made, the bearing of property lines being determined with reference to true north. The computations and maps for this survey have been completed. This work was done under chapter 181, Laws of 1917.

During October, 1917, cross-sections were taken at the sites of the Hudson street and High street bridges at Cohoes.

The reports for the several contracts follow.

Contract No. 74

This contract is for excavating a channel in the Hudson river and the Mohawk river and performing work incidental thereto from Sta. 146+65 to Sta. 171+90. Length, 0.48 mile. It was awarded to Dunbar & Sullivan Dredging Co., being signed on February 13, 1914. The engineer's preliminary estimate was \$256,372.00, the contractor's bid, \$240,872.00. The value of work done during the year is \$15,071. On November 20, 1917, the Canal Board accepted the work and approved the final account, which amounted to \$215,741.49.

F. W. Harris, Assistant Engineer, was in charge.

The prism was excavated to full depth and width, except at the junction with contract 70-A, at the end of the last fiscal year. All contract work was finished in September, 1917.

Contract No. 2-G

This contract is for constructing a spillway at the Waterford side-cut, adjacent to Barge canal lock No. 2, and installing Taintor gate with operating equipment. It was awarded to A. A. Parker, being signed on October 17, 1916. The engineer's preliminary estimate was \$9,686.00, the contractor's bid, \$10,779.12. The contract price as modified by alterations Nos. 1 and 2 is \$11,769.85. The value of work done during the year is \$330. The work was accepted October 31, 1917, and the final account, amounting to \$11,589.50, was approved by the Canal Board November 20, 1917.

F. W. Harris, Assistant Engineer, was in charge.

During July, 1917, the removal of old bridge approaches and the building of a roadway to the lock completed this contract.

Contract No. 91

For building and equipping a hydro-electric power-plant on the Erie canal near the east end of Crescent dam. It was awarded to Welles-Boughton & Co., being signed on January 5, 1911. It was assigned to the Holington Co., this assignment being approved by the Superintendent of Public Works July 31, 1911. Construction work began April 3, 1911. The engineer's preliminary estimate was \$44,600.00, the contractor's bid, \$42,940.50. The contract price as modified by alteration No. 1 is \$44,985.50.

No work has been done during the year. The total work done to date amounts to \$43,715.78. For details of work done to date see Report of State Engineer for 1916, page 58.

Contract No. 91-A

This contract is for furnishing and installing new governor equipment for the hydro-electric power-plant at the east end of the Crescent dam. It was awarded to the Lord Construction Co., being signed on November 24, 1916. The engineer's preliminary estimate was \$6,310.00, the contractor's bid, \$5,930.00. The value of work done during the year is \$576. The work was accepted March 6, 1918, and the final account, amounting to \$5,926.10, was approved by the Canal Board March 20, 1918.

The amount paid on extra work orders during the year is \$300.00, total to date, the same.

F. W. Harris, Assistant Engineer, was in charge.

Final tests were made during the year.

Terminal Contract No. 201

This contract is for constructing terminal warehouses at Albany and Whitehall. The following report relates to the work at Albany. The contract was awarded to J. A. Laporte, being signed on January 2, 1917. Construction work began at Albany on April 3, 1917. The engineer's preliminary estimate for this warehouse was \$36,500.00, the contractors bid, \$40,106.50. The contract price as modified by alteration No. 1 is \$46,104.40. The value of work done during the year is \$14,690, to date, \$16,820.

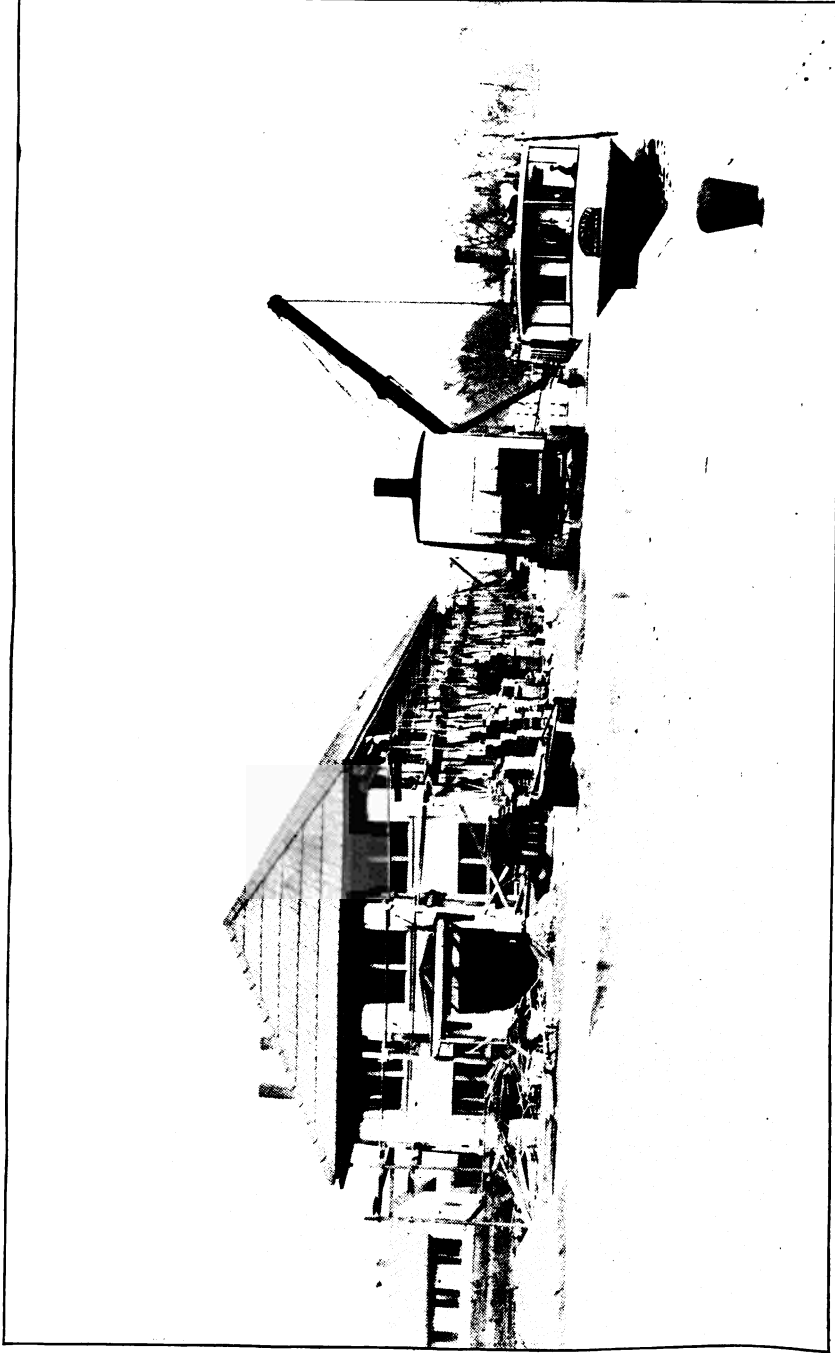
W. L. Caler, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board October 23, 1917, provides for substituting concrete for mastic flooring; placing skylights in the warehouses; paving and underdraining the depressed roadway and railroad track at Albany; placing gravel surfacing on the depressed roadway at Whitehall; and laying a tile drain to conduct the run-off from the easterly slope of the roof of the Whitehall warehouse to the existing sewer. It increases the cost of the Albany warehouse by \$5,997.90.

On July 20, 1917, the warehouse had been concreted to elevation 14.2. Practically all of the side walls are up to elevation 18.2. Erection of steel for the building began on January 18, 1918, and on March 31, 1918, this work, including one field coat of graphite paint, was finished. Fire risers under the floor of the warehouse have been placed. The floor in the warehouse part of the building has been placed, all curbing is in, and the platform in front of the office door and the steps are completed. Six-inch pipe has been placed under depressed roadway to connect the building with the city main. All of the six-inch base for paving the depressed roadway and for paving between the warehouse and the dockwall is in place.

Terminal Contract No. 101

This contract is for furnishing and installing steel stiff-leg derricks on terminal sites at Albany, Whitehall, Little Falls,



BARGE CANAL TERMINAL AT ALBANY

This terminal has a commodious freight-house, a 12-ton steel derrick, an auto crane, a 1,510-foot dockwall, a paved area and track connections, and is well equipped to handle a large amount of traffic.

Rome, Lockport and Tonawanda. The following report relates to the work at Albany. The contract was awarded to E. Brown Baker, being signed on December 18, 1916. On February 21, 1917, it was assigned to the Mohawk Dredge & Dock Co., Inc., and this assignment was approved by the Superintendent of Public Works March 26, 1917. The engineer's preliminary estimate for the derrick at Albany was \$3,771.70, the contractor's bid, \$5,394.20. Excess metal (Albany) to the value of \$1,078.00 has been authorized by the Canal Board. The value of work done at Albany during the year is \$5,900, total done to date, the same.

W. L. Caler, Assistant Engineer, is in charge.

J. A. Laporte is the subcontractor for excavation, concrete, removing pavement and relaying pavement.

The work of removing pavement for derrick excavation began on April 18, 1918. Stone block pavement was replaced and grouting finished on May 13, and the derrick was raised on May 31. Steelwork on the derrick was completed on June 7, 1918.

Terminal Contract No. 106

This contract is for furnishing fourteen two-ton steam tractor cranes for Barge canal terminals. The following report relates to the one tractor crane delivered at Troy. The contract was awarded to the John F. Byers Machine Co., being signed on February 14, 1918. The engineer's preliminary estimate was \$5,250.00 per crane, the contractor's bid, \$5,265.00 per crane. The contract price as modified by alteration No.1 is \$5,515.00 per crane. The value of work done at Troy during the year is \$4,460, total done to date, the same.

C. A. Curtis, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board March 27, 1918, provides for housing the fourteen cranes under this contract. It increases the contract price by \$250 per crane.

The crane was delivered at the Troy site and assembled the latter part of June, but was not given an official test.

Terminal Contract No. 36 — Cohoes

This contract is for constructing a terminal at Cohoes. It was awarded to the Troy Public Works Co., being signed on March 27,

1917. The engineer's preliminary estimate was \$61,000.00, the contractor's bid, \$57,600.00. The value of work done during the year is \$8,100, total done to date, the same.

F. W. Harris, Assistant Engineer, is in charge.

The contractor has completed three fifty-foot sections of dock-wall at the north end of the terminal and has placed coffer-dam for two more sections.

ERIE CANAL, MOHAWK RIVER RESIDENCY

Assistant Engineer M. E. James reports:

For several years past, the Mohawk River residency extended from Mindenville on the west to Rexford on the east, a distance of 54.2 miles. On April 1, 1918, when residency office No. 2, Erie canal, located in the Parker building at Schenectady, was closed, the Mohawk River residency was extended 14.2 miles on the east, to Crescent, making the total length of this residency 68.4 miles.

Reports are given on the following contracts: Contracts Nos. 118, 129, 135, 150, 155, 180 and 185, the work order and special agreement of contract No. 20-D, terminal contracts Nos. 8-P, 10-P, 12-F, 64 and 214, and the portions of terminal contracts Nos. 103-A, 106 and 204 within this residency. Report is also made on the removal of bars in the Barge canal channel under two agreements made by the Superintendent of Public Works, one with Holler & Shepard, dated April 13, 1918, and one with the American Pipe and Construction Co., dated April 22, 1918, in connection with which the engineering work is performed by forces from this office.

During the past year the residency office has been maintained in the Mark building, Amsterdam. All appropriation maps, release and retention maps and flood maps mentioned in the following report have been prepared in the residency office, also the location and contour maps which accompanied the claim reports.

The engineering force on this residency during the year has been engaged at various times in making observations along the Mohawk river when floods occurred, marking high-water limits and getting the elevations of these heights. Considerable data



BARGE CANAL TERMINAL (LOWER) AT TROY

At the far end of the warehouse, trucks have access to the dockwall, while railroad tracks lie along the wall at the near end. The terminal is equipped with derricks for transferring freight.

were collected and tabulated during the year for the standardization of gages located within the limits of this residency. The flood of February 26, 1918, at South Chuctanunda creek was investigated and data collected and tabulated. During the past year rain gages have been installed at lock No. 8, Scotia, and lock No. 14, Canajoharie.

Several properties at various localities within this residency were investigated in connection with claims against the State. Some time was spent by the engineering forces in going over other properties with claim agents of the Department of Public Works. A report was also rendered on the advisability of placing protection along the Fagel property, located on the north bank of the Mohawk river about $1\frac{1}{2}$ miles west of lock No. 8, at Scotia. A report was made to the Division Engineer relative to the cost of a right of way and road to the Kemeter and Windbiel properties near lock No. 11, Amsterdam.

In October, 1917, the Department of Public Works did considerable sweeping of the Barge canal channel east from lock No. 8, at Scotia, and this work was inspected by engineers on this residency and a report of the obstructions found was tabulated and sent to Albany. A general report was made, covering the entire residency from Mindenville to Rexford and showing where bars and obstructions in the Barge canal channel were located, as determined by members of this Department.

During the year minor accidents occurred to boats navigating the canal and reports on these accidents have been made to the Division Engineer.

At dam No. 5, Rotterdam, considerable information was obtained in connection with the condition of this dam and lock. Many plans showing the progress of this work and tabulation of the information obtained have been prepared and sent to Albany. The preparation of separate sets of plans and sections, showing just what work has been done at dam No. 5 at different times has been started in the residency office and is well progressed to date.

A report was made on the application of the American Locomotive Co. for a grant of lands under water opposite their plant in Schenectady. A survey in connection with this grant was made

and mapped and forwarded to Albany. After acquiring this land, the American Locomotive Co. constructed riprap protection along the bank. Engineers from this residency inspected this work and submitted a report.

A detailed report in connection with work necessary for maintenance of the canal for the coming year was made during the fall of 1917.

In October, 1917, an investigation was made of the bridge-rollers and stud-bolts in the bridges at dams Nos. 5 to 11, inclusive, and a report on their condition was submitted.

Plans showing the filling in of the Barge canal channel just below lock No. 8 at Scotia were submitted. This preliminary information was for work now being done by Holler & Shepard under agreement of April 13, 1918. Sections and data were prepared and sent in for plans of work to be done under contract No. 185 at lock No. 8, Scotia, and lock No. 9, Rotterdam. Maps showing plan and profile of the Chuctanunda Gas Co. property at Amsterdam were submitted to Albany. These preliminary data were for the preparation of plans for terminal contract No. 12-F, which contract has been let and completed during the past year. Plans were prepared and soundings taken, showing conditions at the Rexford aqueduct. This information was for the preparation of plans for contract No. 180, which contract has been let and completed during the year. Plans and profiles of the approaches to the Schenectady terminal were submitted, to be used in the preparation of plans for terminal contract No. 8-P, which contract is now in process of construction. A plan showing the condition of the terminal wall at Amsterdam was submitted, to be used in connection with the preparation of plans for terminal contract No. 214, construction under which contract is now in progress.

Surveys of the two approaches to the bridge at dam No. 5, Rotterdam, were made in connection with the proposal to turn these approaches over to the towns on each side of the river. Maps have been prepared from these surveys and forwarded to Albany, but in an uncompleted condition. The decision of certain matters in this case have not yet been given, consequently the maps could not be completed.

When navigation opened on this section of the canal for the season of 1918, it was necessary to locate the buoys and stake lights for marking the Barge canal channel and considerable time was devoted to this work by employees on this residency. During the past year many buoys were displaced, owing to floods and other causes. These were replaced by the Department of Public Works with the assistance of engineers from this Department.

The final estimate for contract No. 20-D, comprising approximately 1,300 sheets, was completed during the year and forwarded to Albany. The final estimate for contract No. 20-D, special agreement, was also forwarded to Albany. Final accounts for the extra work order dated November 14, 1916, on contract No. 20-D and for the extra work order dated June 5, 1916, on contract No. 118, were also prepared and submitted to Albany. Eleven partial accounts for the extra work order dated January 15, 1917, contract No. 20-D, repairs to dam No. 5 at Rotterdam, have been checked and sent to Albany during the year.

In my report of last year I mentioned that Mr. E. D. Hendricks, Senior Assistant Engineer, formerly in charge of this office, and Mr. C. E. Vedder, Junior Assistant Engineer, of this office, had volunteered and enlisted in the U. S. army. During the past year Mr. A. G. Austin, Assistant Engineer on this residency, volunteered and enlisted in the U. S. army. Mr. Stephen Zierak, Laborer in this residency, was drafted in the National army and Howard S. Deal, Boatman, volunteered and enlisted in the 23d U. S. Engineers during the year. I understand that Messrs. Hendricks, Vedder, Deal and Zierak are now located "somewhere in France." I wish to report also that the remaining men on this residency have shown their patriotism by liberally subscribing to liberty loans, war savings campaigns, Red Cross, War Chest funds, etc.

During the past year of navigation on this river section of the canal, boatmen have been compelled to tie up along the line on account of floods, and, in a few cases, for repairs, etc. In most cases this was done at terminal walls, if one was located near at hand. If not, it was necessary to use the guide-walls of the nearest lock. Although this has not yet congested traffic on the canal, it may do so when traffic has increased. Hence, to take

care of increased traffic and emergencies, such as accidents or floods, I believe that suitable mooring places should be provided at convenient intervals along the river according to a plan to be developed by a study of conditions. I take the liberty to mention this matter, since I believe it to be a coming necessity in connection with the maintenance of the canal.

On the site of old contract No. 20-B a right-to-flood survey and map was made for lands of Peter F. Nellis, and sent to Albany. Surveys and investigations in connection with buoys have been made. Records have been searched and data compiled in connection with the claim filed by S. Pearson and Son, Inc.

On the site of old contract No. 20-C an appropriation survey and map was made for lands of Jay Van Dusen, and sent to Albany. Surveys and investigations in connection with buoys have been made. On claim No. 14,969, Byron Miller, claimant, a report has been made, together with the usual location map, showing the property claimed to have been damaged.

The reports of surveys on other contracts are given with the reports of those contracts.

During the past year all work mentioned in the report for this residency has been under my supervision and direction.

Contract No. 20-D

This contract, which was for dredging a channel in the Mohawk river from Yosts to Rexford, was completed last year, but two work orders under this contract had not been finished. The amount paid on extra work orders during the year is \$102,808.26, total to date, \$152,229.52.

A. G. Austin, Assistant Engineer, was in charge until January 15, 1918; now Wm. M. Griffith, Junior Assistant Engineer, is in charge of this work.

An extra work order dated November 14, 1916, provides for placing second-class riprap below dam No. 4, at Scotia. The final account, amounting to \$18,007.20, was approved by the Canal Board October 3, 1917.

An extra work order dated January 15, 1917, provides for the construction of a coffer-dam around the north span of dam No. 5, at Rotterdam, and making repairs to this dam. Work to the value of \$87,004.26 has been done during the year.

The placing of riprap below dam No. 4 with the derrick-boat continued during July and the work was completed on August 21, 1917.

The work at Rotterdam has progressed as follows:

Prior to the beginning of this fiscal year, a coffer-dam extending from the upper end of the river wall of lock No. 9 to the north pier of dam No. 5 had been started. During July, 1917, about two-thirds of the round-pile bents were driven, starting from the river wall. By the end of July this portion of the coffer-dam was completed except for filling and deck-planking. Large timbers hauled from the Rexford aqueduct were used for a crib, which was built at the north pier. During July several round piles were driven to replace those broken off by the flood of June, 1917. Work on the coffer-dam was well advanced during the month of August, 1917. About 50 steel piles remained to be driven along the outside face and the crib at the north pier was nearly finished. All the braces, wales, caps, etc., were in place. The driving of wooden and steel piling for the coffer-dam was completed and the pile driver and scow used for this work were removed from the site early in September. Material from excavation near Cranesville was hauled by scows and dumped along the coffer-dam at dam No. 5, and, the latter part of September, dipper-dredge No. 1 completed filling the coffer-dam and banking it with material. During the early part of October, additional banking was placed against the coffer-dam and the dredge and equipment were removed from the work.

As the water within the coffer-dam was lowered, additional wales and braces were placed to strengthen the wooden sheet-piling along the inside face and also the deck-planking was placed. The slab of concrete placed under contract No. 119 was first unwatered on October 11, 1917, and a boiler and steam drills were set up. The drilling of holes through the concrete slab placed under contract No. 119 and the sill of the dam proper placed under contract No. 8, to determine the condition of the foundation under the dam, was begun immediately and continued through the months of October, November and December, 1917, and January and February, 1918. During March, 1918, high water and ice, together with cold weather conditions, interrupted the drilling considerably.

A small amount of drilling was done in April, 1918. Three-inch holes were drilled through the sill of the dam, the apron of the dam, the slab above the sill of the dam and the concrete placed under extra work order of November 18, 1912. In all, 104 holes were drilled in the north span of the dam, 10 holes in the middle span of the dam near and below the north pier, 20 holes through the floor of the lock chamber and one hole through the step at the lower end of the lock on the outside of the river wall. During November and December of 1917, large holes, 2 ft. by 2 ft. square, were cut through the sill of the dam above the cut-off wall and through the slab of concrete placed under contract No. 119. Thirteen of these holes were cut through for the purpose of placing gravel filling under the dam. Progress sheets, showing the location of these holes and information obtained, were sent to the Division Engineer at short intervals. From the information obtained it was found that cavities, or voids, ranging up to 14 cubic feet, existed under the sill of dam No. 5 and also that there was a large cavity existing under the north pier and a portion of the middle span of the dam. The erosion under the dam extended almost to the bottom of the sheeting placed in the cut-off wall.

A flood occurred, October 30 to November 2, and delayed the work at this dam. During the flood the coffer-dam was allowed to fill and the water reached a height of about 3.5 feet above the coffer-dam, the deck of which is at elevation 241.0. When the flood subsided, it was found that no material damage had resulted to the coffer-dam and the work was resumed. During November a considerable amount of gravel was hauled from the spoil-bank on the south side of the river to the site inside of the coffer-dam, the material being deposited through a chute from the bridge overhead. This work was continued during December, 1917.

All gates of dam No. 5 were raised from the river December 6, 1917, for the winter. About the middle of the month, the uprights and two gates of the dam adjacent to and south of the north pier were lowered into position for the purpose of diverting the water so that the work of drilling holes through the apron of the dam below the gates could be continued. A small timber dam about 50 feet long, extending south from the south side of the north pier, was placed in position at the coffer-holes below the two

gates for diverting the water, and the gates of the dam, being no longer required for that purpose, were raised from the river on December 20, 1917. After the gates of the dam had been raised, considerable trouble was experienced from high water in the lower pool, and, to carry on the work of drilling, it was necessary to construct coffer-boxes about 6 feet square, in which the drills were placed.

During January, 1918, the hauling of gravel, cement and coal was continued, also the drilling and filling of holes with gravel and grout. Cold weather conditions through the month interrupted the work considerably.

During February an ice breaker was constructed at the crib in front of the north pier. The work progressed until about February 20, when the ice in the river broke up and moved out. Practically no damage was done to the coffer-dam. From February 20 the work was practically at a standstill, owing to ice, snow and high water conditions. General repair work was carried on, however, and material was received and stored. This general work was continued through the month of March. Also 40-foot piles were cut in the woods and hauled to the site of the work. Additional coffer-boxes were constructed and slight repairs made to the coffer-dam. The latter part of March, a small force was engaged in cutting ice away from the lower lock-gates, also from the scow in the lock and cleaning the lock of ice. During this month the sunken pavement behind the lock was raised. Pipe lines for drills were placed and the last two days of the month, the water having receded and the river being free of ice, the contractor placed drills within the coffer-dam and started drilling.

During April a diver was engaged in locating the various holes drilled and in placing three-inch pipes in them for grouting. Grouting was carried on with two grout mixers. This work of grouting was continued throughout May and June.

The lower gates of dam No. 5, in the south and middle span, were lowered into position on May 3, 1918, and the top gates were lowered and the water raised to pool elevation a few days later. During May and June the contractor received several carloads of cement and also several hundred cubic yards of sand from the spoil-bank at Pattersonville.

The latter part of May most all the three-inch drilled holes and the large 2-ft. by 2-ft. holes had been filled with gravel and grouted. These holes, with a few exceptions, have been sealed. On June 9, a well-drill outfit was delivered and on the 12th it started drilling eight-inch holes through the sill of the dam on a line about 15 feet from the river wall of the lock. Eight of these holes have been drilled to June 30, 1918.

The total material placed under the sill of the dam, the floor of the lock and the north pier to June 30, 1918, is about as follows: 240 cu. yds. of gravel placed through the large square holes under the sill of the dam and the north pier; 600 cu. yds. of 1 : 1 grout placed through the three-inch holes under the sill and the north pier; 45 bags of cement, used in a 1 : 2 : 4 mixture of concrete, placed through the large square holes under the pier; 27 cu. yds. of gravel placed through the eight-inch holes under the sill of the dam; 21 cu. yds. of concrete placed through the eight-inch holes under the sill of the dam, and 35 cu. yds. of 1 : 1 grout placed through the three-inch holes under the floor of the lock-chamber.

Construction work at this site did not interrupt navigation during the past year. Owing to cross currents, some difficulty was experienced in entering the lock from the lower pool. Under this work order pile clusters of five piles were driven below the lock and these have been an aid to navigation.

During the past year, surveys were made and appropriation maps prepared and sent to Albany for releasing parcel No. 4,017, N. Y. C. R. R.; parcel No. 4,023, N. Y. C. R. R., and parcel No. 3,329, Dominico Falduta.

Also during the past year, properties were investigated and reports on the following claims, together with maps showing the topography and location of the properties involved, were made and forwarded to the Division Engineer at Albany: David Chaze, claim No. 15,277; Mary Cole, claim No. 15,276; Ross Clark, claim No. 15,275; Frank Carbone, claim No. 15,258; LeRoy DeNise, claim No. 14,309; Joseph Duesler, claim No. 15,265; Peppino Falco, claim No. 14,311; Negola Fasolo, claim No. 14,317; Ada Fero, claim No. 15,261; Albert H. Goodman, claim No. 15,267; Nicolas Giombottista, claim No. 14,301; Georgianna Gray Jewett, claim No. 15,256; William Koehlar,

claim No. 15,259; Harry McKenney, claim No. 15,270; Pietro Marcucci, claim No. 15,269; Paul Peters, claim No. 15,274; George W. Putman, claim No. 15,262; Emilie Sievert, *et al.*, claim No. 15,263; Hanna M. Seburn, *et al.*, claim No. 15,264; Mina Southard, claim No. 15,266; Dora Tollner, claim No. 15,260; John Ulrich, claim No. 14,233; Herrick B. Willsey, claim No. 15,263; Cora C. Young, claim No. 15,257.

Contract No. 20-D — Special Agreement

This agreement provides for completing certain work which had been added to contract No. 20-D by alterations. It was signed by the American Pipe and Construction Co., contractors for contract No. 20-D, and by the Superintendent of Public Works on April 2, 1917. The value of work done during the year is \$42,403. The work was accepted October 31, 1917, and the final account, amounting to \$64,815.90, was approved by the Canal Board January 30, 1918.

A. G. Austin, Assistant Engineer, was in charge until January 15, 1918. Since that time, M. J. Quinn, Junior Assistant Engineer, has been in charge.

Range stakes and gages have been set and maintained for the contractor during the past year for finishing the work on this contract. Original sections have been taken ahead of the dredges and at the end of each month, when the dredge was working, for computing the monthly estimate of work done.

The plant on this contract during the year, consisting of two dipper-dredges, three derrick-boats and a fleet of tugs and bottom-dump scows, have progressed the work on this contract to completion during the year.

Dipper-dredge No. 1, during July, 1917, excavated under alteration No. 9, just below the B. & M. R. R. bridge, between Stas. 1550 and 1560, also placed bank protection along the north bank between Stas. 1515 and 1495 and along the south bank between Stas. 1473 and 1455. The excavation by this dredge below the B. & M. bridge was continued during the month of August and finished on September 18, when the dredge was dismantled and moved to lock No. 9 at Rotterdam for filling the coffer-dam under extra work order for repairs to dam No. 5 at

that place. The filling of the coffer-dam was completed during October, 1917, and the dredge was removed from the contract and taken to Waterford.

Dipper-dredge No. 3, during July, 1917, excavated below dam No. 6 at Cranesville under alteration No. 9 and finished the work at this point August 14, when the dredge moved to the SanSai kill stream entrance and removed some refill material, which was spoiled along the coffer-dam at dam No. 5. The excavation at the SanSai kill stream entrance was finished August 17, and the dredge was moved to the harbor at Cranesville. During September, 1917, this dredge was taken to Schenectady and did some excavation between Stas. 1215 and 1212, opposite the American Locomotive Works, and completed the removal of the Freeman's bridge piers at Sta. 1200. The stone from the bridge piers was spoiled as wash wall at the American Locomotive Works bank protection work. This dredge finished its work in this vicinity September 13, and returned to the harbor at Cranesville.

The foregoing work done by the dipper-dredges Nos. 1 and 3 completed the work under contract No. 20-D, special agreement, dated April 2, 1917.

Contract No. 150

This contract is for the construction of a concrete apron below the head-gates of the Vischer Ferry dam. It was awarded to the Brown & Lowe Co., being signed on December 1, 1916. Construction work began December 6, 1916. The engineer's preliminary estimate was \$20,300.00, the contractor's bid, \$21,780.00. The value of work done during the year is \$1,283. The work was accepted September 5, 1917, and the final account, amounting to \$22,273.00, was approved by the Canal Board October 9, 1917.

J. C. Bell, Assistant Engineer, was in charge.

Work under this contract was completed within a few days after the beginning of the fiscal year.

Contract No. 155

This contract is for furnishing and installing seven hoists for the operation of the bulkhead gates in the north end of the Vischer Ferry dam. It was awarded to Lupfer & Renick of Buffalo, N. Y., being signed on January 31, 1917. Construction work

began February 28, 1917. The engineer's preliminary estimate was \$9,998.00, the contractor's bid, \$11,586.00. The value of work done during the year is \$8,478. The work was accepted and the final account, amounting to \$11,327.86, was approved by the Canal Board May 1, 1918.

C. B. Tebo, Engineering Assistant, has been in charge.

An extra work order dated March 25, 1918, provides for repairing hoists damaged at the time of the spring flood.

At the beginning of the year the hoists had been placed in position on the dam and some work done on the gates. No work was done during July, August and September. In October stop-logs were placed at gate No. 7 and the gate was removed, repaired, painted and replaced. At gate No. 6 stop-logs were placed, the gate removed and repairs begun. The work during October was delayed considerably, owing to bad weather conditions. Work was continued during November and finished on gates Nos. 5 and 6. By December 1 about 53 per cent of this contract had been completed. In December, part of the old racks were removed and stored and the new racks placed in position and work on gates Nos. 3 and 4 was completed. During January, 1918, work on gates Nos. 1 and 2 was finished and all the hoists had been set and testing started. During the first fifteen days of February, five gates were completed and tested. In March the remaining two gates were completed and tested, completing this contract.

During February, 1918, owing to extreme cold weather, the gates became frozen and about February 20 the weather moderated and the river rose to flood stage. To relieve the flood conditions, forces of the Superintendent of Public Works proceeded to raise the bulkhead gates at the Vischer Ferry dam and in doing so broke some of the gears on the hoists which had just previously been completed, tested and found satisfactory. Also they loosened the anchorages on some of the machines. To repair this damage an extra work order was issued under date of March 25, 1918.

During May, 1918, the new gears were delivered at the site of the work. Two of them, upon being machined, were found to be defective and were rejected. The balance of the new gears

were installed during the month of June and the machines were satisfactorily anchored in place. As soon as the two defective gears are placed satisfactorily, the final account of this extra work order will be rendered.

Contract No. 180

This contract is for removing a portion of the aqueduct at Rexford and completing the adjacent canal-prism excavation. It was awarded to the Dunbar & Sullivan Dredging Co., being signed on March 15, 1918. Construction work began April 17, 1918. The engineer's preliminary estimate was \$17,840.00, the contractor's bid, \$15,958.00. The value of work done to date is \$15,810.

M. J. Quinn, Junior Assistant Engineer, is in charge.

On April 16, 1918, two derrick-boats and two tugs were moved to the site of the work, and on the 17th the contractor started removing the old masonry in the piers which are to be removed. During May the removal of these piers was completed, the arches were removed and the temporary bridge, which had been erected under an extra work order of contract No. 20-D, was removed and stored in the trunk of the aqueduct outside the limits of this contract. During June the prism excavation under this contract was completed and the work was practically finished.

When the temporary wooden bridge was being removed, it fell into the river, through negligence on the part of the contractor's forces, and broke several of the timbers in the trusses and bent the tie rods. The contractor is repairing this damage. The final estimate is well started and will be rendered as soon as the wooden bridge has been satisfactorily repaired.

Contract No. 129

This contract is for the construction of the substructure, superstructure and approaches of Freeman's bridge over the Mohawk river near Schenectady at about Barge canal center line Sta. 1198 + 93. It was awarded to The Foundation Co., being signed on June 6, 1916. Construction work began June 14, 1916. The engineer's preliminary estimate was \$80,976.50, the contractor's bid, \$87,390.80. The contract price as modified by



FREEMAN'S BRIDGE OVER THE MOHAWK RIVER NEAR SCHENECTADY
Under one span runs the Barge canal, while under the other the river flows in its natural channel.

alterations Nos. 1 and 2 is \$89,900.80. The value of work done during the year is \$46,862. The work was accepted December 4, 1917, and the final account, amounting to \$82,201.62, was approved by the Canal Board, January 23, 1918.

Alteration No. 2, approved by the Canal Board October 16, 1917, provides for placing concrete pavement on the north approach. It increases the contract price by \$1,430.00.

The erection of the steelwork was finished and the bridge proper completed and painted by October 11, 1917. The contract work was finished November 30, 1917.

Contract No. 185

This contract is for improving the river channel below the movable dams at Scotia and Rotterdam. It was awarded to Robert Wetherill, Receiver, American Pipe and Construction Co., being signed on June 24, 1918. Construction work has not begun. The engineer's preliminary estimate was \$230,550.00, the contractor's bid, \$154,395.00.

M. J. Quinn, Junior Assistant Engineer, is in charge.

The contractor has been delivering coal at convenient places for use on the dredge which is to be engaged on this work.

The engineering force has been taking original cross-sections and laying out the work.

Contract No. 118

This contract, which was for the construction of a new city highway bridge across the Mohawk river at Amsterdam, was completed last year, but the extra work order dated June 5, 1917, which provided for furnishing and installing six brass Yale locks for signal lamps, had not been finished. The final account for this order, amounting to \$31.05, was approved by the Canal Board December 4, 1917. The total amount paid on extra work orders on this contract is \$2,031.05.

Contract No. 135

This contract is for excavating a point of land on the south bank of the Mohawk river between the bridge and dam No. 10 at Canajoharie and performing incidental work. It was awarded

to the Great Lakes Dredge & Dock Co., being signed on September 18, 1916. Construction work began April 24, 1917. The engineer's preliminary estimate was \$78,052.00, the contractor's bid, \$57,038.00. The value of work done during the year is \$9,417. The work was accepted October 9, 1917, and the final account, amounting to \$48,637.34, was approved by the Canal Board November 20, 1917.

The excavation of the point of land was finished with the 20-inch hydraulic dredge *Massachusetts*, the material being spoiled in the old canal. On August 8, 1917, when the contract was nearly completed, the pump on this dredge gave out and the dredge was then dismantled and removed from the site on August 15. The pontoons and discharge pipe were removed on August 21. The work of sloping the south bank of the channel was completed on September 21. This finished the contract.

Terminal Contract No. 204

This contract is for constructing temporary warehouses at Schenectady, Amsterdam, Fonda, Ilion and Frankfort. The following report relates to the warehouses at Schenectady, Amsterdam and Fonda. The contract was awarded to Byron, Forman and Riggs, Inc., being signed on March 12, 1917. On April 23, 1917, it was assigned to Kennedy & Scullen and this assignment was approved by the Superintendent of Public Works May 2, 1917. The engineer's preliminary estimate was \$1,160.00 for Schenectady, \$1,160.00 for Amsterdam and \$815.00 for Fonda; the contractor's bid, \$1,058.35 for Schenectady, \$1,058.35 for Amsterdam and \$738.90 for Fonda. The contract price as modified by alteration No. 1 is \$4,037.60 for Schenectady, \$5,969.00 for Amsterdam and \$4,037.60 for Fonda. Excess iron and steel fastenings to the value of \$12.60 (\$7.20 at Amsterdam and \$5.40 at Fonda) have been authorized by the Canal Board. The work was accepted and the final account, amounting to \$19,023.35, was approved by the Canal Board October 23, 1917. The final account for Schenectady was \$4,046.30, for Amsterdam \$5,962.65 and for Fonda \$4,051.30. The amount paid on extra work orders is \$117.61 at Schenectady, \$54.59 at Amsterdam and \$117.61 at Fonda, all during the fiscal year.



BARGE CANAL TERMINAL AT SCHENECTADY

General view of the terminal. A boat owned and operated by the General Electric Co. for its own traffic is seen in the foreground.

An extra work order dated July 2, 1917, provides for placing galvanized wire screens over the windows and doors of the warehouses. The final account, amounting to \$272.95, was approved by the Canal Board October 23, 1917. The cost at each warehouse was \$54.59.

An extra work order dated July 9, 1917, provides for placing door-guards on the warehouses at Schenectady, Fonda, Ilion and Frankfort. The final account, amounting to \$189.52, was approved by the Canal Board October 23, 1917. The cost at Schenectady and Fonda was \$63.02 each.

These warehouses were practically finished by July 1, 1917, with the exception of the lighting systems, which have since been completed.

Terminal Contract No. 8-P

This contract is for paving the terminal site at Schenectady. It was awarded to James P. Kelly, being signed on April 15, 1918. Construction work began in May, 1918. The engineer's preliminary estimate was \$8,400.00, the contractor's bid, \$8,400.00. The value of work done to date is \$1,000.

M. J. Quinn, Junior Assistant Engineer, is in charge.

Excavation for macadam pavement in the vicinity of the freight-house is nearly finished; also this macadam pavement is practically completed. The paving bricks have been received and stored on the site of the work and samples have been tested and found satisfactory, but the laying of this pavement has been delayed because the contractor for the railroad and crane tracks has been unable to get these rails delivered.

Terminal Contract No. 64

This contract is for constructing railroad and crane tracks on the Barge canal terminal at Schenectady. It was awarded to Robert Wetherill, Receiver, American Pipe & Construction Co., being signed on April 24, 1918. Construction work began May 1, 1918. The engineer's preliminary estimate was \$9,000.00, the contractor's bid, \$10,021.30. The value of work done to date is \$2,150.

M. J. Quinn, Junior Assistant Engineer, is in charge.

An extra work order dated June 4, 1918, provides for making

alterations and extensions to the electrical equipment at the Schenectady terminal freight-house.

During May a small force scraped dirt from the old macadam and did excavating to subgrade for the tracks. During June the work was held up because, owing to congested freight conditions, the contractor was unable to get his shipment of ties, rails, etc. In the latter part of June a carload of rails, bolts, fish-plates, etc., was received, as were also the ties. These have been unloaded and hauled to the site of the work. During the latter part of the month the contractor was making preparations for laying track. A small amount of excavation has been made.

Terminal Contract No. 103-A

This contract is for furnishing, installing and testing two portable package-freight conveyors for Barge canal terminals. One of these is to be installed at Schenectady. The contract was awarded to the Brown Portable Conveying Machinery Co., being signed on October 3, 1917. The engineer's preliminary estimate was \$3,900.00 each, the contractor's bid, \$4,100.00 each.

This conveyor has not been delivered. No payments have been made.

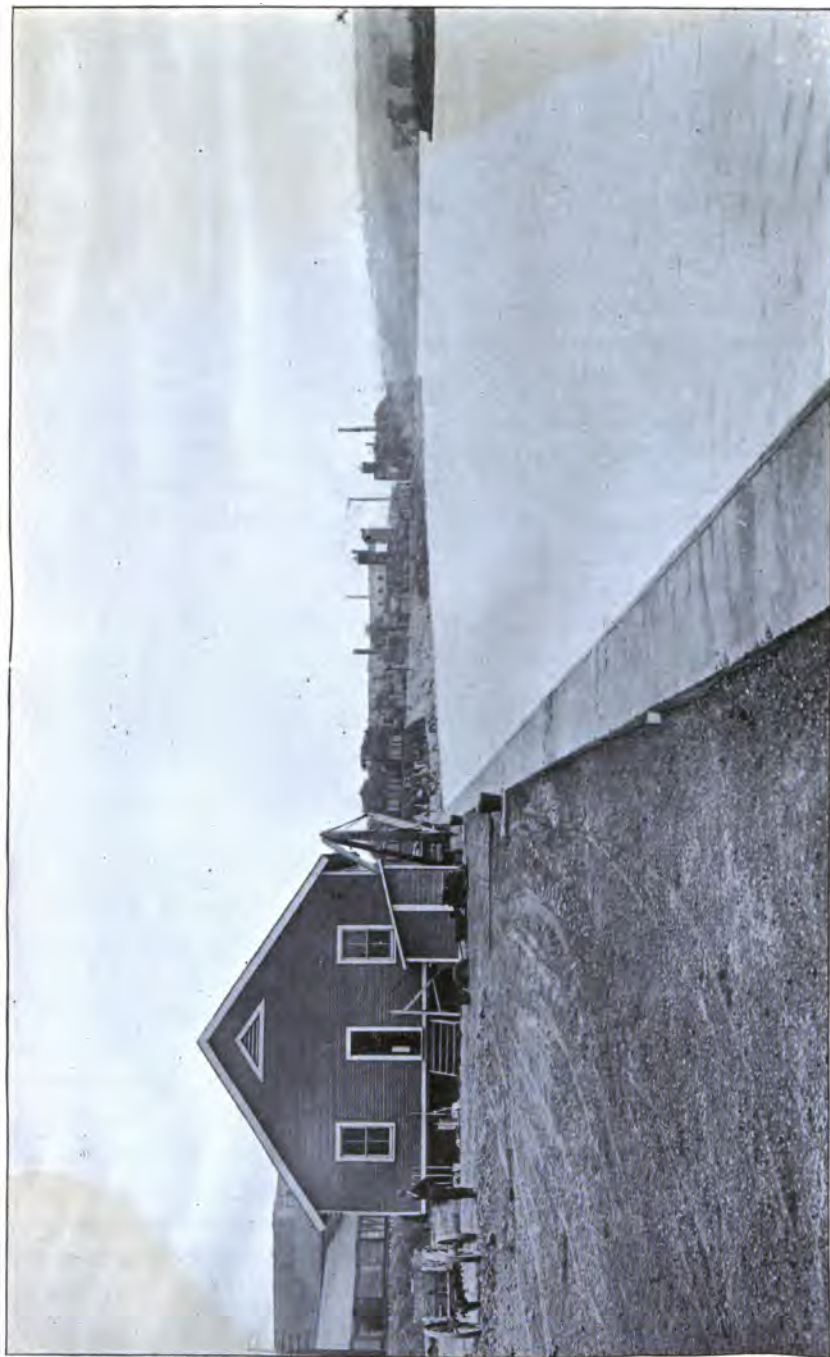
Terminal Contract No. 106

This contract is for furnishing fourteen two-ton steam tractor cranes for Barge canal terminals. One of these is for Schenectady and one for Amsterdam. It was awarded to the John F. Byers Machine Co., being signed on February 14, 1918. The engineer's preliminary estimate was \$5,250.00 per crane, the contractor's bid, \$5,265.00 per crane. The contract price as modified by alteration No. 1 is \$5,515.00 per crane. The value of work done at Schenectady to date is \$5,510.

M. J. Quinn, Junior Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board March 27, 1918, provides for housing the fourteen cranes under this contract. It increases the contract price by \$250.00 per crane.

The crane and housing for the Schenectady terminal was delivered at the terminal site in June, 1918. This machine was assembled and found satisfactory on test. The crane for the terminal at Amsterdam has not been delivered.



BARGE CANAL TERMINAL AT AMSTERDAM

The traffic at Amsterdam was so heavy that a second warehouse had to be erected. The view shows the excavation in the foreground preparatory to laying pavement and building the second house, which is to occupy a site at the extreme left.

Terminal Contract No. 214

This contract is for constructing a frame freight-house and laying pavement at Amsterdam. It was awarded to the Kennedy & Scullen Construction Co., being signed on April 26, 1918. Construction work began May 20, 1918. The engineer's preliminary estimate was \$16,478.00, the contractor's bid, \$16,323.00. The value of work done to date is \$6,180.

A. P. Mussi, Assistant Engineer, is in charge.

This contract includes all of the pavement at the Amsterdam terminal and a second freight-house, one having already been built under an earlier contract. Work under this contract was started on May 20, and before the end of the month the site of the new freight-house had been graded and excavation for pavement east and west of the existing freight-house, for the curbing east of the freight-house and for the new freight-house piers had been made; also the concrete for two piers on the east end of the building and about 153 lin. ft. of concrete curbing at the east end of the terminal had been placed.

During June good progress was made. The concrete piers for the new freight-house were completed. The curbing east of the existing freight-house was all placed except about 40 feet, also the curbing on the west side and in front of and around the new freight-house. Excavation has been made and forms are about ready for the concrete curbing still to be placed under this contract. About 175 lin. ft. of the concrete foundation for pavement has been placed east of the existing freight-house, also that portion west of the building and in front of the new freight-house. The 8-in. x 12-in. stringers were placed and bolted to the piers of the new freight-house and the framework was erected. The flooring has been laid, siding put on, roofing boards placed, the wainscoting completed and the guard-studs for the large sliding doors set. The metal track for the sliding doors has been placed and the door and window trim well progressed. The work of placing the composition roofing has been started. By request of the Superintendent of Public Works the contractor has been working his forces nine hours per day to hasten completion of the work.

Terminal Contract No. 12-F

This contract is for constructing a woven wire fence adjacent to the roadway approach to the Amsterdam terminal. It was awarded to the Anchor Post Iron Works, being signed on April 16, 1918. Construction work began in June, 1918. The engineer's preliminary estimate was \$1,289.00, the contractor's bid, \$1,379.50. The work is finished ready for acceptance and the final account has been prepared. No monthly estimates were rendered.

A. P. Mussi, Assistant Engineer, was in charge.

This fence was fabricated in the shops of the Anchor Post Iron Works and shipped to Amsterdam. The material arrived during June, 1918, and the work of erection was started and completed during the month. The corner and gate posts and line posts along the easterly side were all set in concrete foundations and the fence erected in a satisfactory manner.

Terminal Contract No. 10-P

This contract is for paving the terminal site at Fonda. It was awarded to Patrick W. Mulderry, being signed on April 12, 1918. Construction work began in June, 1918. The engineer's preliminary estimate was \$8,602.00, the contractor's bid, \$8,700.00.

A. P. Mussi, Assistant Engineer, is in charge.

Excavation for the concrete curbing west of the freight-house has been completed and grading for brick pavement is started. The contractor has received the paving brick and stored them on the site of the work. The money value of the work being small, no monthly estimate has yet been rendered.

Canal Maintenance

REMOVAL OF BARS BELOW LOCK NO. 8, AT SCOTIA

On April 13, 1918, the Superintendent of Public Works entered into an agreement with Holler & Shepard for the removal of bars in the Barge canal prism below lock No. 8, at Scotia, payment to be on the basis of a specified daily rental for plant plus labor and material necessary to carry on the work. Two estimates, amounting to \$8,834.47, have been approved by this office.

The work has been looked after by M. J. Quinn, Junior Assistant Engineer, with office at Schenectady.

A dipper-dredge belonging to the above company left Fort Edward April 25, 1918, and arrived at Schenectady April 28, where it was set up. On April 30 it was moved to lock No. 8 at Scotia and began the excavation of the heavy gravel bar lying above grade within the Barge canal channel. The work was continued during May and June and by July about 15,000 cu. yds. of material had been removed and spoiled along the south bank of the river below the lock, where the General Electric Co. was building a new pumping station. The material excavated by the dredge was spoiled within reach of a derrick which the contractor for this pumping station had on the south bank of the river, and was subsequently used as backfill around the pumping station. Some of the excavated material was also spoiled in the north channel below the lock.

Canal Maintenance

REMOVAL OF BARS BETWEEN FONDA AND INDIAN CASTLE

On April 22, 1918, the Superintendent of Public Works entered into an agreement with the American Pipe and Construction Co., Robert Wetherill, Receiver, for the removal of bars in the Barge canal channel between Fonda and Indian Castle, payment to be on the basis of a specified daily rental for plant plus labor and material necessary to carry on the work. One estimate, amounting to \$5,900.44, has been approved by this office.

The work has been looked after by A. P. Mussi, Assistant Engineer, from the Amsterdam office.

Dipper-dredge No. 3, belonging to the above company, left the harbor at Cranesville on May 4, 1918, and arrived at the Fonda terminal, where it was set up. It was ready to remove bars in the channel by May 10.

The sand bars found in May, 1917, near the Fonda terminal had shifted during the past winter and could not be found at that locality, so the dredge moved west to lock No. 13 at Yosts on May 13 and began excavating a large gravel bar along the lower guide-wall of lock No. 13. High water interrupted this work until May 15. On May 18 the removal of this bar was

completed and the dredge started to move downstream, cleaning the channel to a point about one mile east of the lock. At this point another bar was located, the removal of which occupied the balance of the month. After the dredge had completed the removal of this bar, it cleaned the channel downstream to a point about $1\frac{1}{2}$ miles east of lock No. 13, at Yosts, where another large bar was found. The dredge worked the balance of June on this bar.

To July 1, 1918, this dredge has removed about 17,500 cu. yds. The material removed during May and the first part of June from the bars at the lower guide-wall and at a point one mile east of the lock was spoiled along the north bank of the river and the material excavated the latter part of June from the bar at a point $1\frac{1}{2}$ miles east of the lock was spoiled along the south bank of the river.

ERIE CANAL, RESIDENCY NO. 4

Senior Assistant Engineer E. A. Lamb reports:

This residency extends from 0.5 mile east of old lock No. 34, at Mindenville, to the Herkimer-Oneida county line, a distance of 27.8 miles.

In office work, besides the regular routine of weekly reports, correspondence, checking monthly estimates, etc., four appropriations have been mapped, checked and sent to the Division Engineer's office since June 30, 1917, and about 10 maps have been made to accompany reports to the Division Engineer on claims, complaints, etc., released land, applications for use of land, permits, etc. Also, the final estimates for contracts Nos. 18-A, 30, 30-A, 122, 153 and 158 and for terminal contract No. 208 have been finished and checked.

Buoy maps for locating the prism have been prepared and iron pins and pipe have been placed in the field and then located or indicated on the maps. This work was done for the purpose of setting buoys and channel lights. Thus far more or less difficulty has been experienced in preserving these points, for the reason that it is necessary to place some of the stake lights and markers on private property and the owner often intentionally

removes them. I believe the State should own a right of way along the bank of the improved river section of the Barge canal.

During the year a record has been kept of the daily readings of the gage located on the dam for the hydraulic canal on West Canada creek, and of measurements of the daily flow through the head-gates of this canal.

The field work for the so-called finished-plan maps has been completed from Sta. 3869 + 78.89 to Sta. 4027. These maps have been plotted and sent to the Division Engineer's office.

Also, an offset center line has been established and monumented from Little Falls, near Hansen island bridge, to Mohawk, near the new junction lock.

Blue Line Surveys.

(Chapter 181, Laws of 1917)

After the blue line maps through the city of Little Falls were approved, the maps were divided into parcels and each parcel was given a number. Information for the description of these parcels has been prepared and sent to Albany.

This blue line work has since been continued from Barge canal center line Sta. 3868 + 78.98 to Sta. 4278. The line has been run and iron pins and monuments set at the various angle points. The topography has been taken over nearly the whole line. The base line has been plotted to a scale of 40 feet to the inch and also to a scale of 100 feet to the inch. The notes have been reduced and computed and the surveys checked with Government stations of the base line from Little Falls to lock No. 18 at Jacksonburg.

The Clinton ditch, or original Erie canal, base line and topography from Barge canal center line Sta. 3974 to Sta. 4078 has been plotted to a scale of 100 feet to the inch and the points are being staked out in the field.

The Rocky Rift feeder blue line has been run and topography taken. Two maps have been plotted, one to a scale of 100 feet to the inch, the other to a scale of 40 feet to the inch.

An offset center line has been run as a base line from about Barge canal center line Sta. 4055 to Sta. 4217, and monuments have been set, but no office work has been done.

From Jacksonburg, near lock No. 18, to a monument located a short distance west of the junction lock at Mohawk, a distance of 4.44 miles, the base line for the blue line maps has been established and the monuments for the same stretch are complete. This base line, as far as possible, has been tied to U. S. triangulation points.

Between Jacksonburg, Barge canal lock No. 18, and Fort Herkimer, east of old Erie lock No. 41, the courses for the northerly and southerly blue lines have been completed and adjusted and are ready for mapping as soon as the angle points are located in the field and marked with iron pins.

Reports are given on the following contracts: Contracts Nos. 18-A, 29-A, 30-A, 122-A, 133, 137 and 146 and part of No. 153, also terminal contracts Nos. 27-P, 37, 40 and 208 and those portions of terminal contracts Nos. 101 and 204 within the limits of this residency.

Contract No. 18-A

This contract provided for the completion of the canal from lock No. 16 at Mindenville to the westerly end of Little Falls, a distance of 8.91 miles. The contract was accepted December 13, 1916, and the final account, amounting to \$1,668,069.38, was approved by the Canal Board April 12, 1917.

During the fiscal year just ended final payment has been made on one extra work order and the last extra work order has been finished and paid. The amount paid on extra work orders during the year is \$8,991.95, total to date, \$25,083.60.

An extra work order dated November 9, 1916, provided for repairs to the concrete stairway at lock No. 17, for changing the gearing on the lower gate of lock No. 17, to reduce the speed of operation, and for chipping concrete at end of lower approach wall, lock No. 17, to provide support for timber walks leading to cribs. The final account, amounting to \$2,534.76, was approved by the Canal Board July 25, 1917.

An extra work order dated December 4, 1916, provided for placing concrete tops on the nine cribs below lock No. 17, together with board walks and snubbing-posts, for placing approximately 600 feet of guard-rail along the vertical wall at Little Falls, and for placing additional riprap in the vicinity of lock No. 16.

The final account, amounting to \$8,302.75, was approved by the Canal Board December 4, 1917.

There still remain within the limits of the contract a Lidgerwood excavator, located above the entrance to lock No. 16 on the north embankment, a steam-shovel near the high bridge on the south side of the prism, and, near the temporary lock, a drill-boat, which was at one time used as a hydraulic dredge. This drill-boat is sunk. A guy derrick, a quantity of junk, etc., are located near the dive culvert.

Contract No. 137

This contract is for driving steel sheet-piling at dam No. 10, Canajoharie, and other incidental work. It was awarded to J. A. Laporte, being signed on October 13, 1916. Construction work began October 31, 1916. The engineer's preliminary estimate was \$27,333.00, the contractor's bid, \$22,650.00. The value of work done during the year is \$3,872. On February 5, 1918, the Canal Board accepted the work and approved the final account, which amounted to \$17,041.90. The amount paid on extra work orders during the year is \$824.00, total to date, the same.

An extra work order dated November 8, 1917, provides for transporting and placing stone as riprap. The final account, amounting to \$824.00, was approved by the Canal Board December 19, 1917.

On July 1, 1917, the steel sheet-piling and concrete seal along the upstream face of the north span were in place and the steel sheet-piling had been driven along the face of the north abutment and the upstream face of the south span. Some piling had also been driven on the north side of the middle pier and along the face of the south abutment. The driving of steel piling at the south abutment was finished by July 20, and on August 31 the piles around the upper end of the middle pier had all been driven. This finished the work of driving steel sheet-piling. The placing of the concrete seal over the steel sheet-piling was finished by December 7, 1917, as was also the placing of riprap under the extra work order of November 8, 1917. The old cofferdam has been removed. Some of the steel piles that could not

be pulled were burned off and six wooden piles were cut off. On December 21, 1917, the contract work was finished with the exception of removing two forms from the concrete seal and replacing a wicket chain that was damaged in driving the steel piling.

Contract No. 122-A

This contract is for constructing the substructure and superstructure, and completing the approaches of a highway bridge over the Mohawk river (Barge canal prism) at about center line Sta. 4246+42, near Little Falls. It was awarded to Chesley, Earl & Heimbach, Inc., being signed on March 8, 1917. Construction work began April 21, 1917. The engineer's preliminary estimate was \$52,717.00, the contractor's bid, \$67,053.10. The contract price as modified by alteration No. 1 is \$67,377.00. Excess fourth-class riprap to the value of \$315.00 has been authorized by the Canal Board. The value of work done during the year is \$33,900, total done to date, \$37,130.

W. C. Benedict, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board October 23, 1917, substitutes steel sheet-piling for wooden sheet-piling under the two piers of the new bridge and eliminates the removal of the old bridge. It increases the contract price by \$323.90.

The approaches, except for some lining yet to be placed, were made from material excavated from the coffer-dams and borrow from river spoil-banks near by and hauled by teams.

The abutments and piers are completed according to the plans as modified by alteration No. 1, steel sheet-piling being substituted for the wooden sheet-piling under the pier foundations. The wooden sheet-piling could not be driven in the material encountered.

The piers were built inside coffer-dams of steel sheet-piling driven by a combination pile-driver and derrick placed on scows. The round piles were driven by a drop hammer in 45-foot leads, and the sheet-piles by a steam hammer. The concrete was placed in the footing courses by a bottom-dump bucket.

The north and south girder spans have been bolted into position and are ready to be riveted. The steel for the channel truss span is being scraped and wire-brushed and given another shop

coat of red-lead paint, due to not being protected from the weather after receiving the first shop coat. .

Contract No. 181

This contract is for repairing and water-proofing the existing concrete prism and placing new concrete lining in the canal at Little Falls. It was awarded to Law Brothers, being signed on December 28, 1917. The engineer's preliminary estimate was \$46,624.00, the contractor's bid, \$54,694.00. The value of work done during the year is \$47,370.00, total done to date, the same.

E. F. Dossert, Junior Assistant Engineer, is in charge.

On December 26 the contractor began to assemble his plant and to draw material for concrete. This work continued until March 29, when the actual work of construction began. The clearing away of the ice and debris from the place where the lining was to be placed was done by raising and lowering the level of the water in the canal. The prism was then graded and concrete placed at the west end of the contract, Sta. 4821+25. The materials and mixer were placed on the old tow-path and the concrete was conveyed by chutes to the canal bottom.

At the east end, about Sta. 4304, the silt deposit on top of the existing concrete lining was excavated by wheelbarrow gangs and spoiled in the bed of the old Erie canal adjacent to the north bank. Test holes in the old concrete lining were drilled and the existing concrete lining removed in places where it had been undermined and the holes refilled with second-class concrete.

After the old lining was put in shape the whole area was water-proofed by a process which consists of three layers of hot bitumen and two layers of cotton fabric impregnated with the hot bitumen layed alternately. Over this was placed three inches of first-class concrete. The concrete was mixed on the top of the wall and conveyed by chute to dump cars on a narrow-gage track in the canal bottom; thence the cars were hauled by an auto truck to the dumping place. The work, except the coping above pool level, was discontinued May 12 and cannot be completed until December, when navigation closes.

Contract No. 30-A

This contract is for completing the construction of the improved Erie canal at its intersections with the old Erie canal, and incidental work, between Jacksonburg and Herkimer. It was awarded to E. Brown Baker, being signed on November 24, 1916. On February 21, 1917, it was assigned to the Mohawk Dredge & Dock Co., Inc., and this assignment was approved by the Superintendent of Public Works March 26, 1917. Construction work began November 24, 1916. The engineer's preliminary estimate was \$122,013.00, the contractor's bid, \$128,182.00. The contract price as modified by alteration No. 1 is \$128,837.20. The value of work done during the year is \$44,851. The work was accepted January 16, 1918, and the final account, amounting to \$124,460.85, was approved by the Canal Board April 10, 1918.

C. G. Ranney, Assistant Engineer, was in charge.

Alteration No. 1, approved by the Canal Board October 16, 1917, provides for using $\frac{3}{8}$ -in. steel sheet-piling in place of $\frac{1}{4}$ -in. steel sheet-piling above the dry-span arches near the Herkimer guard-gate. It increases the contract price by \$655.20.

On July 1, 1917, there remained to be done, to complete this contract, the following: Grading slope and placing bank protection on south prism slope east of the junction lock at Mohawk; grading slope, removing dry wall and placing bank protection between Stas. 4650 and 4655; placing riprap under-pinning east of Washington street bridge, Herkimer.

The dry wall at Fort Herkimer was removed by dipper-dredge and the slope made partly by dipper-dredge and partly by derrick-sloper boat. The stone excavated from the old dry wall was used in the bank protection as well as some additional stone from the quarry west of Jacksonburg.

The work was completed in December and the plant removed and contract cleaned.

Contract No. 146

This contract is for constructing a new movable dam to replace dam No. 14, at Herkimer. It was awarded to the Peckham Construction Co., Inc., being signed on April 18, 1918. The engineer's preliminary estimate was \$81,726.20, the contractor's

bid, \$93,769.40. Excess sheeting and bracing to the value of \$429.00 has been authorized by the Canal Board. The value of work done during the year is \$180, total done to date, the same.

C. G. Ranney, Assistant Engineer, is in charge.

The excavation has consisted in removing existing riprap bank protection from above the present water-surface on the north and south sides of the river.

The contractor has been engaged in constructing a store-house and roadways across the New York State Railways' tracks for an approach from the highway and across the existing dry channel for an approach from the Barge canal.

Contract No. 153

The portion of this contract affecting this residency provided for delivering at Herkimer 38 red and 45 black oil-burning lanterns for buoy, stake and bridge lights. It was awarded to R. B. Wing & Son of Albany, N. Y., being signed on February 28, 1917. The engineer's preliminary estimate was \$12.00 per lantern, the contractor's bid, \$12.54 per lantern. On October 3, 1917, the Canal Board accepted the work and approved the final account, the amount being the same as the contractor's bid.

C. G. Ranney, Assistant Engineer, was in charge.

Eighty-three lanterns were delivered at Herkimer at a cost of \$1,040.82. These lanterns had been delivered at the beginning of the fiscal year and were being tested prior to acceptance.

Contract No. 133

This contract is for constructing a junction lock at Mohawk. It was awarded to Morrison & Quinn, Inc., being signed on October 16, 1916. Construction work began in December, 1916. The engineer's preliminary estimate was \$47,534.00, the contractor's bid, \$48,638.80. The value of work done during year is \$2,383. The work was accepted October 9, 1917, and the final account, amounting to \$48,637.34, was approved by the Canal Board November 20, 1917. The amount paid on extra work orders during the year is \$2,623.10, total to date, \$3,192.98.

H. W. Jewell, Junior Assistant Engineer, was in charge.

An extra work order dated August 15, 1917, provides for placing certain operating machinery and furnishing miscellaneous parts.

An extra work order dated November 20, 1917, provides for constructing a drain at the junction lock. The final account, amounting to \$2,623.10, was approved by the Canal Board April 24, 1918.

The greater part of this contract was completed and the lock in operation prior to July 1, 1917. The remaining work, consisting of some excavation and embankment and a small piece of concreting, was completed and the contract cleaned up by early fall.

Contract No. 29-A

This contract is for completing the construction of the canal within the limits of old contract No. 29. It extends from a point one-half mile east of Sterling creek to the Herkimer-Oneida county line. Length, 4.0 miles. It was awarded to the Eastover Construction Co., Inc., being signed on March 27, 1916. Construction work began early in April, 1916. The engineer's preliminary estimate was \$162,005.00, the contractor's bid, \$185,106.50. The contract price as modified by alterations Nos. 1 to 5, inclusive, is \$318,659.70. Excess quantities to the value of \$1,583.00 have been authorized by the Canal Board. The value of work done during the year is \$139,140, total done to date, \$298,520. The amount paid on extra work orders during the year is \$4,944.60, total to date, the same.

An extra work order dated June 25, 1917, provides for repairing breaks in the south bank between Burch culvert and Harbor bridge. The final account, amounting to \$4,944.60, was approved by the Canal Board December 19, 1917.

Sterling creek dam and entrance and Sterling creek spillway were completed prior to July 1, 1917.

Progress of work on structures is as follows:

Stream entrances. The excavation for the stream entrance at Sta. 5202+54 was made by teams and hand work. The riprap was brought to the site in scows and laid by hand.

At Burch creek entrance. A guy derrick made the excavation necessary and placed the riprap to connect with the adjacent

drainage ditch. The concrete was mixed with a gasoline mixer and placed with a guy derrick.

At Burch culvert. At the inlet a guy derrick made the necessary excavation and placed the riprap. At the outlet similar work was done by the McMyler crane.

At Day culvert. The embankment on the north and south sides has been trimmed by hand and teams. This completes the work at this structure.

At Day spillway. The work provided for by alteration No. 4 at this structure was begun in May, 1917, and carried to completion during the season. The coffer-dam was built and sheet-piling cut-off driven by a derrick-boat. Then a guy derrick was set upon on the west side of the spillway and moved eastward as the work progressed. This derrick made the necessary excavation, drove the foundation piles and placed the concrete. The materials for concrete were brought to the site on scows and mixed by a steam-power rotary mixer. A small traveling derrick was used to place the riprap protections around the lower end of the spillway. It also made the excavation for and placed the riprap roadway across the lower end of the outlet channel.

Prism. The 20-inch hydraulic dredge has completed the excavation below the lock and there is now a 75-foot chanel 12 feet deep the entire length of the contract, with the exception of a small amount of refill, which has entered the prism at certain locations. A derrick-boat, a Bucyrus excavator and a McMyler crane have completed the excavation and the placing of wash wall on the banks throughout the length of the contract. Wash-wall stone was transported from Jacksonburg and Utica. Teams with scrapers have graded the banks on the south side between Harbor and West Schuyler bridges and between Budlong creek and the end of the contract, on the north side between Sta. 5270 and Sta. 5272. Roadways to embankment have been completed. A traveling pile-driver has driven sheet-piling in the south bank, provided for by alteration No. 2. Teams with scrapers, a derrick-boat and a McMyler crane have completed the embankment, with the exception of the north bank between Stas. 5216 and 5220 and some trimming on the south bank between Burch culvert and Harbor bridge. Some of the material used was borrowed and transported to the work in scows.

Drainage ditches. This work has been carried on at the various locations, as follows: Between Burch creek stream entrance and Burch culvert inlet, north side, by guy derricks; between Stas. 5189+75 and 5196, north side, by McMyler crane; between Stas. 5265 and 5290+50, north side, by traveling excavator and teams with scrapers; between Stas. 5337+38 and 5340+64.6, north side, by hand work; between Sta. 5202+48 and Burch culvert outlet, south side, by McMyler crane; between Sta. 5283+84 and Day culvert outlet, south side, by teams with scrapers and hand work.

Bridges. At Harbor bridge the structural steel in the end dams has been placed, existing flooring removed and new flooring with wheel guards replaced. The excavation for concrete back walls has been made and the second-class concrete and second-class reinforced concrete in the south back wall placed. The concrete was mixed by hand.

At West Schuyler bridge. The cinder fill on the south side has been completed and cinders delivered for north side, but not brought to final lines. The cinders were brought to Harbor station by railroad and transported to the bridge by teams. A derrick-boat has placed the wash wall on the cinder fill, south side, and the riprap in front of the south abutment. Highway traffic has been maintained at the bridges.

At Lock No. 19 and guide-walls. Excavation has been made by hand for snubbing-posts, concrete bases have been placed and cast-iron posts set. The lining on the north side of the lock has been completed. Wooden cover plates for quoin-posts and gate anchorage recesses have been made. Defective concrete, as provided by alteration No. 2, has been removed and replaced at lock and guide-walls. Metal reinforcement was used in the replacement on vertical faces of walls. Defective concrete was removed by compressed air drills. In the replacement the concrete was mixed by hand and by gasoline rotary mixer.

Some progress has been made on cleaning up the site of the contract.

Appropriation surveys have been made and maps prepared. Final account sheets to the number of 278 have been made, checked and sent to the division office, and 30 sheets are partially completed.

Terminal Contract No. 37 — Canajoharie

This contract is for the construction of a harbor and dockwall near the outlet of Canajoharie creek at Canajoharie. It was awarded to Holler & Shepard, being signed on August 26, 1915. Construction work began June 16, 1916. The engineer's preliminary estimate was \$33,832.00, the contractor's bid, \$32,272.00. The value of work done during the year is \$13,120, total done to date, \$26,500. The amount paid on extra work orders during the year is \$67.71, total to date, the same.

H. C. Kline, Assistant Engineer, was in charge until June 9, 1918, since which time T. J. Loonie, Assistant Engineer, has been in charge.

An extra work order dated November 8, 1917, provides for resetting forms for a portion of the wall. The final account, amounting to \$67.71, was approved by the Canal Board December 4, 1917.

At the beginning of the fiscal year the work of trenching for the concrete piles under the 300-foot wall was continued. The piles were driven with a steam-hammer and jet and the tops were then cut off to grade. Concrete covering was placed around the anchors and tie rods and the hydraulic dredge continued and completed the harbor excavation. In November, 1917, the anchors, tie rods and wall coping were completed and the snubbing-posts set. At the end of the fiscal year the work remaining to be done on this contract is the placing of the concrete paving, fender piles and third-class riprap and the grading of the spoil-area and roadway.

Terminal Contract No. 40 — St. Johnsville

This contract is for the construction of a harbor and dockwall at St. Johnsville. It was awarded to J. E. Bishop, being signed on September 20, 1915. It was assigned to Scott Brothers and this assignment was approved by the Superintendent of Public Works August 4, 1916. The engineer's preliminary estimate was \$27,963.00, the contractor's bid, \$25,515.81. The contract price as modified by alteration No. 1 is \$27,762.37. The value of work done during the year is \$2,563. The work was accepted

September 5, 1917, and the final account, amounting to \$25,542.91, was approved by the Canal Board October 3, 1917.

Charles R. Waters, Assistant Engineer, was in charge.

Alteration No. 1, approved by the Canal Board February 23, 1916, changes limits of excavation, etc. It increases the contract price by \$2,246.56.

The contract work was finished in July, 1917.

Terminal Contract No. 101

This contract is for furnishing and installing steel stiff-leg derricks on terminal sites at Albany, Whitehall, Little Falls, Rome, Lockport and Tonawanda. The following report relates to the work at Little Falls. The contract was awarded to E. Brown Baker, being signed on December 18, 1916. On February 21, 1917, it was assigned to the Mohawk Dredge & Dock Co., Inc., and this assignment was approved by the Superintendent of Public Works March 26, 1917. The engineer's preliminary estimate for the derrick at Little Falls was \$3,420.70, the contractor's bid, \$5,043.20. Excess metal (Little Falls) to the value of \$1,078.00 has been authorized by the Canal Board. The value of work done at Little Falls during the year is \$5,450, total done to date, the same.

G. A. Ensign, Assistant Engineer, is in charge.

An extra work order dated December 11, 1917, provides for furnishing and installing motors and the necessary connecting gears at Rome and Little Falls.

An extra work order dated April 26, 1918, provides for furnishing materials for a power line from the German street bridge to the derrick.

The excavation for the concrete footings for the derrick at Little Falls was made late in the year of 1917. At that time a small amount of concrete was placed. During the month of April, 1918, these concrete footings were completed, the backfill placed and the steel derrick erected. A small amount of work still remains to be done to make the Little Falls derrick ready for acceptance.

Terminal Contract No. 27-P

This contract is for paving the terminal site at Frankfort. It was awarded to Patrick W. Mulderry, being signed on April 12,

1918. The engineer's preliminary estimate was \$4,100.00, the contractor's bid, \$4,446.00.

Construction work has not yet begun.

Terminal Contract No. 208

This contract is for constructing terminal warehouses at Fort Plain and Little Falls. It was awarded to the Kennedy & Scullen Construction Co., being signed on May 7, 1917. Construction work began at Fort Plain on May 17, 1917, and at Little Falls on May 23, 1917. The engineer's preliminary estimate was \$9,140.00, or \$4,570.00 for each warehouse, the contractor's bid, \$9,278.76, or \$4,639.38 for each warehouse. Excess quantities to the value of \$93.58 (\$62.95 for Fort Plain warehouse, \$30.63 for Little Falls warehouse) have been authorized by the Canal Board. The value of work done during the year is \$478.00 (\$168.00 for Fort Plain, \$310.00 for Little Falls). The work was accepted August 1, 1917, and the final account, amounting to \$9,289.18 (\$4,688.17 for Fort Plain and \$4,601.01 for Little Falls), was approved by the Canal Board October 23, 1917. The amount paid on extra work orders during the year is \$109.18, or \$54.59 for each warehouse.

W. C. Benedict, Assistant Engineer, was in charge of this work.

An extra work order dated July 16, 1917, provides for placing wire screens over the windows and doors of these warehouses. Final account, amounting to \$54.59 for each warehouse, was approved by the Canal Board December 4, 1917.

These warehouses had been nearly completed at the beginning of the fiscal year. The remaining painting and the electrical work was finished in July and the contract completed in August. Prior to September 30 the extra work order for the placing of metal screens on the windows and doors of the warehouses was completed.

Terminal Contract No. 204

This contract is for constructing temporary warehouses at Schenectady, Amsterdam, Fonda, Ilion and Frankfort. The following report relates to the work at Ilion and Frankfort. The contract was awarded to Byron, Forman and Riggs, Inc., being signed on March 12, 1917. On April 23, 1917, it was assigned

to Kennedy and Scullen and this assignment was approved by the Superintendent of Public Works May 2, 1917. The engineer's preliminary estimate was \$815.00 each for Ilion and Frankfort, the contractor's bid, \$738.90 for Ilion and \$733.90 for Frankfort. The contract price as modified by alteration No. 1 is \$2,477.90 each for these two warehouses. The work was accepted and the final account, amounting to \$19,023.35 for the whole contract, was approved by the Canal Board October 23, 1917. The final account for these two warehouses was \$2,481.55 each. The amount paid on extra work orders is \$86.33 each at Ilion and Frankfort, all during the year.

An extra work order dated July 2, 1917, provides for placing galvanized wire screens over the windows and doors of the warehouses. The final account, amounting to \$272.95, was approved by the Canal Board October 23, 1917. The cost at each warehouse was \$54.59.

An extra work order dated July 9, 1917, provides for placing door-guards on the warehouses at Schenectady, Fonda, Ilion and Frankfort. The final account, amounting to \$189.52, was approved by the Canal Board October 23, 1917. The cost at Ilion and Frankfort was \$31.74 each.

This contract was practically finished a year ago.

In concluding this report I desire to renew certain recommendations I made in my report of a year ago and to add one new one.

The first relates to the Erie canal tow-path between South St. Johnsville and Mindenville, which is used to a considerable extent as a highway. By constructing a culvert in the old Erie canal nearly opposite the westerly end of the upper south approach wall to lock No. 16 and by building a road from the present highway to the old tow-path, there would be provided a good way with easy grade to reach the power-house at lock No. 16 from both St. Johnsville and Little Falls. The cost of this improvement at present prices should be less than \$2,000.

The high water of last spring showed more conclusively than any former experience that conditions at the entrance of Castle creek into the Barge canal prism should be changed. In my former report I described the situation and suggested a remedy.

I would add that in March of the present year, although the water of Castle creek 600 feet above the old aqueduct reached an elevation of nearly 337.0, or within four inches of the top of the dike, very little went through the opening in the old tow-path. During the same month and a part of February, from Indian Castle guard-gate to a point several hundred feet westward, the prism was jammed with ice for the full depth and width and the result is that there is from one to two feet of sediment for the full width of the prism from the guard-gate westerly to the beginning of the land-line. Last spring, also, the water in the creek between the West Shore railroad bridge and the Barge canal prism was within two or three inches of the top of the dike on the east side of the creek. The cost of the spillway which I proposed as a solution of this problem would be, by a very liberal estimate at present prices, from \$20,000 to \$25,000.

A cable is needed above the Rocky Rift dam, to make it possible for an operator to remove both the flash-boards and driftwood; also a small hoisting engine for hauling to shore large logs, trees, etc. I would renew by suggestion of a year ago that these be provided.

A suspension foot-bridge across Castle creek at the old aqueduct, to afford access to Rocky Rift dam, is more necessary now than heretofore, since a gage has been established at the dam.

I renew, also, my recommendation for the placing of booms at certain places for the purpose of catching and holding driftwood and debris, so that it will not interfere with navigation or with the operation of locks and dams. These should be located above the Frankfort retaining dam, above the Herkimer dam and below both the West Canada creek and the East Canada creek entrances.

Last year I suggested that about ten stake lights would be needed along a stretch of nearly two miles of channel in the vicinity of Mindenville bridge and westerly therefrom, to keep boats of 10 or 11 feet draft off from an existing berme. However, it would be better to remove the berme.

The 254 acres of good but isolated land between old lock No. 41 and new lock No. 18, together with 50 acres of tillable land belonging to the State, a total of more than 300 acres worth at least \$150 per acre, is still inaccessible to teams. I suggested building a

bridge across the canal to this land. It would cost at least \$18,000.

It would seem advisable that whatever action is necessary should be taken to make it legal for the State to lease the hundreds of acres of appropriated lands for purposes of cultivation. By leasing for terms of five years or more a tenant could afford to fertilize and make productive whatever land is not already tillable.

In order to maintain traffic during the construction of contract No. 18-A it was found necessary to construct a temporary lock. This lock is located about $1\frac{1}{4}$ miles below the Indian Castle guard-gate. Its lift was only about $2\frac{1}{2}$ feet. It was used but one season. Then traffic was opened through the Barge canal prism all the way between lock No. 16 and lock No. 17. The maximum navigable elevation of water in the Barge canal opposite the location of the temporary lock is theoretically about 327.0, but in case of a sudden rise in the river the water reaches elevation 328.0 or 329.0 before the guard-gate is lowered. When this happens the water from the prism of the canal flows through and over the lock wall, which is at elevation 326.0, and floods the old tow-path, which is barely one foot higher, and over the berme bank above the lock, which in places is below elevation 325.0. To prevent this damage a dike should be built from the south Barge canal embankment across the old canal tow-path to the West Shore railroad.

I am very grateful to you and my other superiors in this Department for your counsel and consideration and I desire to express the appreciation of the members of the corps in this residency for the good treatment which has been accorded them.

CHAMPLAIN CANAL, RESIDENCY No. 1

Assistant Engineer R. D. Hayes reports:

This residency extends from the connection with contract No. 1, north of the guard-lock at Northumberland, to the junction with the Erie canal at Waterford. Length, about 27 miles.

Appropriation surveys have been made and release maps pre-

pared, the State, in some instances, reserving flowage rights. A rain gage has been set near lock No. 5. The office work has consisted in checking and typing monthly estimates, making miscellaneous computations and drawings, getting out weekly and monthly reports, pay-rolls, force accounts, etc., for residencies Nos. 1, 2 and 3.

Contracts Nos 70-A, 72-B and 169 have been completed, the work on contract No. 131-A is finished and contract No. 73-A is 97.6 per cent completed. The final account for terminal contract No. 13 has been prepared, but the settlement is in litigation. Detailed reports on these contracts follow.

Contract No. 70-A

This contract is for completing the excavation of a channel in the Hudson river and performing work incidental thereto from Waterford to lock No. 1. It was awarded to the Central Dredging Co., being signed on October 22, 1912. Construction work began in April, 1913. The engineer's preliminary estimate was \$790,488.00, the contractor's bid, \$759,158.88. The value of work done during the year is \$38,102. The work was accepted December 4, 1917, and the final account, amounting to \$789,591.62 was approved by the Canal Board January 30, 1918. The amount paid on extra work orders during the year is \$7,750.00, total to date, \$9,250.00.

John McBride, Assistant Engineer, was in charge.

An extra work order dated July 11, 1917, provides for placing protection along the river bank at the Weber property. The final account, amounting to \$3,400.00, was approved by the Canal Board October 3, 1917.

An extra work order dated August 20, 1917, provides for placing bank protection along the east bank of the Hudson river below lock No. 1. The final account, amounting to \$4,350.00, was approved by the Canal Board December 19, 1917.

During the year the prism has been completed and swept, isolated snubbing-posts below lock No. 1 were placed and the bank was protected against wash. The work under the two extra work orders was finished.

Contract No. 169

This contract is for constructing temporary stone-filled timber guide-cribs below locks Nos. 3 and 6. The following report is for the work below lock No. 3. The contract was awarded to Holler & Shepard, being signed on June 28, 1917. Construction work began in July, 1917. The engineer's preliminary estimate for the whole contract was \$3,508.00, the contractor's bid, \$3,066.00. Excess iron and steel fastenings to the value of \$144.00 have been authorized by the Canal Board. The value of work done on this residency is \$1,713.20. The work was accepted October 9, 1917, and the final account, amounting to \$2,882.53 (\$1,713.20 for this residency), was approved by the Canal Board November 20, 1917.

James B. Foote, Assistant Engineer, was in charge.

The contractor finished building the cribs below lock No. 3 in August, 1917.

Contract No. 72-B

This contract is for widening the canal prism in the Hudson river from the mouth of the Hoosic river to the south end of Green island. It was awarded to James Stewart & Co., Inc., being signed on July 7, 1916. Construction work began July 15, 1916. The engineer's preliminary estimate was \$207,700.00, the contractor's bid, \$108,540.00. The value of work done during the year is \$1,417. The work was accepted August 15, 1917, and the final account, amounting to \$92,516.58, was approved by the Canal Board September 5, 1917.

W. L. Caler, Assistant Engineer, was in charge.

The prism excavation was practically finished last year. The sweeping of the prism was completed in July, 1917.

Contract No. 73-A

This contract is for completing the construction of the canal from Northumberland to Stillwater. Length, about 15 miles. It was awarded to the Great Lakes Dredge & Dock Co., being signed on January 15, 1916. The engineer's preliminary estimate was \$432,045.00, the contractor's bid, \$321,679.92. The contract price as modified by alterations Nos. 1, 2, 3 and 4 is \$506,169.67. Excess quantities to the value of \$2,270.00 have

been authorized by the Canal Board. The value of work done during the year is \$129,290, total done to date, \$447,430. The amount paid on extra work orders during the year is \$2,530.77, total to date, \$2,874.92.

Mott Palmer, Junior Assistant Engineer, is in charge.

Alteration No. 4, approved by the Canal Board August 15, 1917, provides for removing a point of rock on the east side of the channel just below the Northumberland bridge and for excavating refilled bars at other points. It increases the contract price by \$47,904.00.

An extra work order dated December 4, 1916, provides for relocating the capstan at the lower end of lock No. 5. The final account, amounting to \$530.77, was approved by the Canal Board October 23, 1917.

An extra work order dated October 5, 1917, provides for removing two sunken canal boats below lock No. 5. The final account, amounting to \$2,000.00, was approved by the Canal Board December 4, 1917.

Above Lock No. 5. The prism from Sta. -21 to Sta. -11 has been swept. The prism has been finished and swept east of Sta. -20, from Sta. -11 to Sta. 5, and from Sta. 18 to Sta. 43. Wash wall has been laid on the west slope from Sta. 5 to Sta. 1+80. Fourth-class riprap has been laid on the west slope from Sta. 1+80 to about Sta. -(1+60). All work has been completed above lock No. 5, except the placing of timber snubbing-posts back of the timber-crib dock above guard-lock No. 10, as called for under extra work order, dated September 5, 1916. Excavation was done with dipper-dredges and a hydraulic dredge.

Below Lock No. 5. The prism excavation has been completed from Sta. 41 to Sta. 61 and the settling basin has been excavated. The prism has not been swept. All excavation was done with dipper-dredges.

At Coveville. The prism excavation has been completed from Sta. 283 to Sta. 286 and from Sta. 325 to Sta. 330.

At Wright's. The prism excavation has been completed from Sta. 553 to Sta. 564.

At Bemis Heights. The prism excavation has been completed from Sta. 627 to Sta. 642, but has not been swept.

At Stillwater. The prism excavation from Sta. 759 to Sta. 781 has been completed, but has not been swept. The isolated cast-iron snubbing-posts have not been set.

Contract No. 131-A

This contract is for completing the reconstruction of the highway bridge crossing the main channel of the Hudson river at Schuylerville. It was awarded to Michael Fitzgerald, being signed on March 5, 1917. Construction work began in April, 1917. The engineer's preliminary estimate was \$30,753.00, the contractor's bid, \$39,634.50. Excess foundation piles to the value of \$140.00 have been authorized by the Canal Board. The value of work done during the year is \$36,460, total done to date, \$36,880. The amount paid on extra work orders during the year is \$640.04, total to date, the same.

C. A. Curtis, Assistant Engineer, is in charge.

An extra work order dated October 16, 1917, provides for replacing the floor on the channel span. The final account, amounting to \$487.40, was approved by the Canal Board June 19, 1918.

An extra work order dated March 2, 1918, provides for a temporary floor over the bridge. The final account, amounting to \$150.00, was approved by the Canal Board March 20, 1918.

Work on the east abutment was commenced in July, 1917, and the first steel was placed in November, 1917. The bridge was opened for traffic on February 22, 1918. Contract work was finished June 30, 1918.

Terminal Contract No. 13 — Schuylerville

This contract is for constructing a guard-lock and bridge at Schuylerville. It was awarded to Lou B. Cleveland, being signed on December 29, 1914. It was assigned to the Kendar Engineering and Construction Co., Inc., and this assignment was approved by the Superintendent of Public Works on December 16, 1915. On February 23, 1916, the Canal Board suspended the contract and since then the work has been under the supervision of the Department of Public Works, J. W. Holler, of the firm of Holler

& Shepard, taking charge. The engineer's preliminary estimate was \$61,664.60, the contractor's bid, \$42,742.80.

The construction work on this contract was practically finished prior to July 1, 1917. The final estimate has been made up and sent to the division office, but the settlement is in litigation.

CHAMPLAIN CANAL, RESIDENCY No. 2

Assistant Engineer R. D. Hayes reports:

This residency extends from the Northumberland bridge, across the Hudson river, northerly to the highway bridge at Dunham's Basin, Washington county, and includes the Glens Falls feeder and dam.

The work on this residency has been directed from the Mechanicville office. During the past year active work has progressed on contracts Nos. 1-A, 128 and 169. Of these, the last two contracts have been finished.

Under a special agreement between Holler & Shepard and the Superintendent of Public Works, dated April 14, 1917, for the removal of bars between Fort Miller and Whitehall, 30,645 cu. yds. of material were removed between Fort Miller and the northerly limit of this residency.

Under a special agreement between Holler & Shepard and the Superintendent of Public Works, dated September 12, 1917, a new road is being constructed between the Delaware & Hudson railroad bridge and the Idle Hour club premises at Fort Edward.

A number of claims have been investigated and reports forwarded to the office of the Division Engineer.

All other contract work on this residency was completed prior to July 1, 1917.

Contract No. 128

This contract is for the construction of the substructure, superstructure and approaches of a highway bridge over the Hudson river at Northumberland. It was awarded to Holler & Shepard, being signed on May 27, 1916. Construction work began in August, 1916. The engineer's preliminary estimate was \$77,751.50, the contractor's bid, \$76,486.70. The value of work

done during the year is \$15,381. On June 26, 1918, the Canal Board accepted the work and approved the final account, which amounted to \$74,591.29.

C. A. Curtis, Assistant Engineer, was in charge.

An extra work order dated March 7, 1918, provides for refilling old highway where material had been removed.

The erection of the substructure and general excavation work was done by the contractors. The steelwork was sublet to the W. S. Rae Co., which furnished and erected the superstructure during the season of 1917.

Contract No. 169

This contract is for constructing temporary stone-filled, timber guide-cribs below locks Nos. 3 and 6. It was awarded to Holler & Shepard, being signed on June 28, 1917. Construction work began in July, 1917. The engineer's preliminary estimate was \$3,508.00, the contractor's bid, \$3,066.00. Excess iron and steel fastenings to the value of \$144.00 have been authorized by the Canal Board. The value of work done on this residency is \$1,169.33. The work was accepted October 9, 1917, and the final account, amounting to \$2,882.53 (\$1,169.33 for this residency), was approved by the Canal Board November 20, 1917.

James B. Foote, Assistant Engineer, was in charge.

The contractor placed and finished building the cribs below lock No. 6 at Fort Miller during July, 1917.

Contract No. 1-A

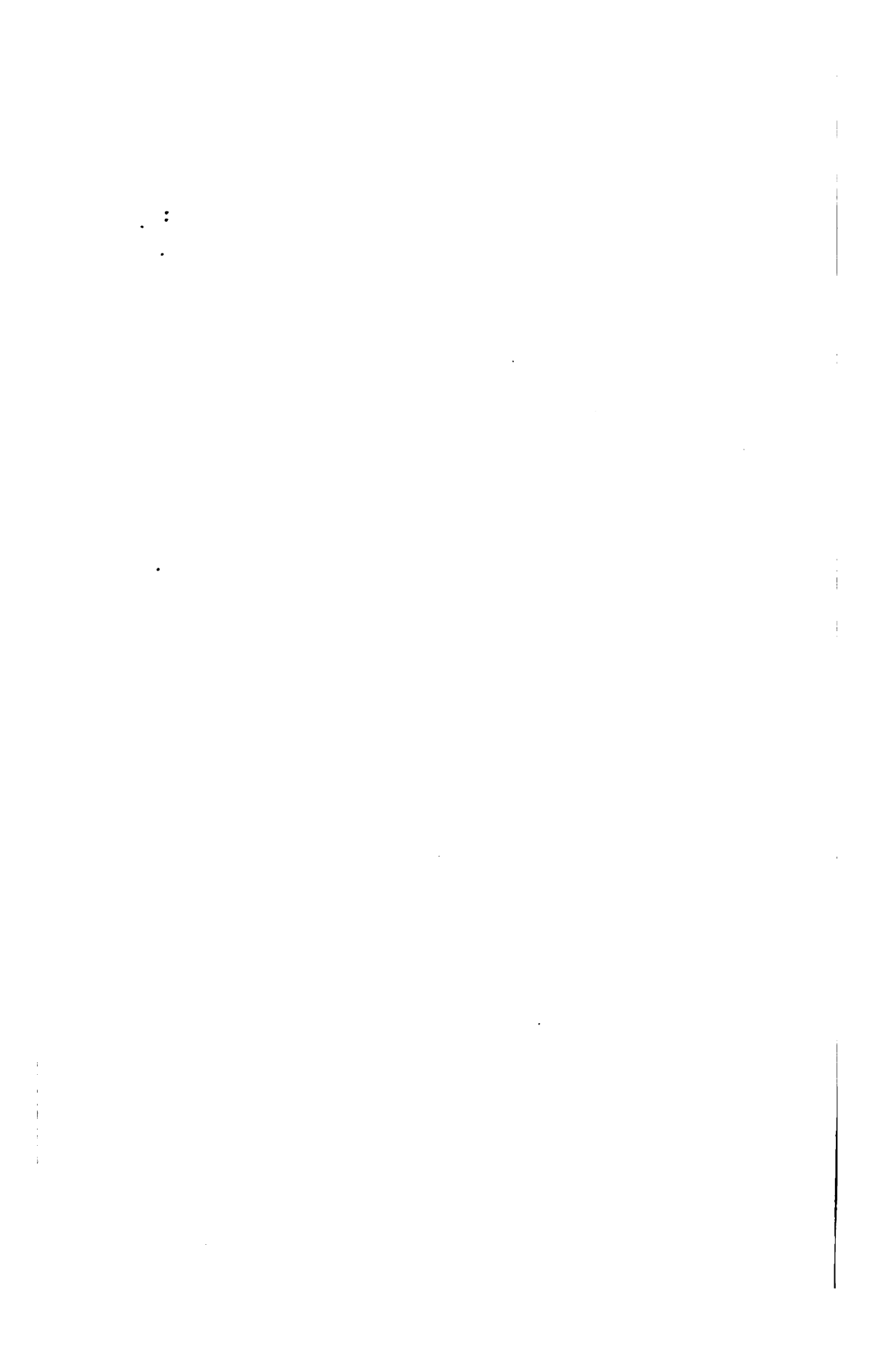
This contract is for completing the construction of the canal from Crocker's Reef to Fort Edward. It was awarded to Holler & Shepard, being signed on August 31, 1914. The engineer's preliminary estimate was \$90,811.00, the contractor's bid, \$120,459.40. The contract price as modified by alterations Nos. 1, 2 and 3 is \$141,540.20. Excess excavation to the value of \$67,200 has been authorized by the Canal Board. The value of work done during the year is \$30,990, total done to date, \$193,530. The amount paid on extra work orders during the year is \$455.00, total to date, the same.

James B. Foote, Assistant Engineer, is in charge.



BRIDGE OVER THE HUDSON RIVER AT NORTHUMBERLAND

Two spans cross the river channel and one longer span crosses the canal channel. This bridge replaces the old structure, from which boats were towed across the river in the transfer of the canal from one bank to the other.



Alteration No. 2, approved by the Canal Board October 31, 1917, provides for changing the location of the center line of the canal between Sta. 295 and Sta. 334, just north of Crocker's Reef. It decreases the contract price by \$335.20.

Alteration No. 3, approved by the Canal Board December 19, 1917, provides for placing bank protection along the west bank of the Hudson river at the property of Alfred Taylor and along the west shore and at the southerly extremity of Bradley's island, near lock No. 7.

Prism excavation has progressed, a dipper-dredge and derrick-boat being used. A drill-boat has been used for drilling in the prism. The resurfacing of concrete at Crocker's Reef has been completed. Under alteration No. 3, 1,503 cu. yds. of rock-spoil protection have been placed. The plant was laid up for the winter on November 28, 1917. The work of furnishing and placing flash-boards on the Crocker's Reef dam under the extra work order dated March 29, 1917, is 70 per cent completed.

CHAMPLAIN CANAL, RESIDENCY No. 3

Assistant Engineer R. D. Hayes reports:

This residency extends from the highway bridge at Dunham's Basin, Washington county, northerly to Lake Champlain at Whitehall, a distance of 19.8 miles.

A number of claims on contracts Nos. 15 and 25 have been investigated and reports sent to the Division Engineer's office. Rain gages have been set near locks Nos. 9 and 12.

Under a special agreement between Holler & Shepard and the Superintendent of Public Works, dated April 14, 1917, for the removal of bars between Fort Miller and Whitehall, 9,780 cu. yds. of material were removed between lock No. 9 and the bridge at Smith's Basin.

Under an agreement between J. W. Holler and the Superintendent of Public Works, dated May 29, 1918, for dredging the channel of the Barge canal between lock No. 8 and the Comstock bridge, 2,420 cu. yds. of material were excavated from the prism

near Smith's Basin, and 6,175 cu. yds. were removed about one and one-half miles south of Whitehall.

All work on this residency has been directed from the Mechanicville office.

Terminal Contract No. 201

This contract is for constructing terminal warehouses at Albany and Whitehall. The following report relates to work at Whitehall. The contract was awarded to J. A. Laporte, being signed on January 2, 1917. The engineer's preliminary estimate for the warehouse at Whitehall was \$22,800.00, the contractor's bid, \$25,068.35. The value of work done at Whitehall during the year is \$6,550, done to date, \$6,950.

W. L. Caler, Assistant Engineer, is in charge.

The warehouse has been concreted to elevation 118.3 and about 60 sq. yds. of concrete flooring have been placed.

On November 19, 1917, the erection of steel for the building was begun. Work was suspended from December 12 to December 27, 1917, on account of cold weather. The steelwork has been painted one field coat of gray paint. Twelve-inch vitrified pipe has been laid on the east and west sides of the building. The fire risers in the storage part of the building are installed.

Terminal Contract No. 101

This contract is for furnishing and installing steel stiff-leg derricks on terminal sites at Albany, Whitehall, Little Falls, Rome, Lockport and Tonawanda. The following report relates to the work at Whitehall. The contract was awarded to E. Brown Baker, being signed on December 18, 1916. On February 21, 1917, it was assigned to the Mohawk Dredge & Dock Co., Inc., and this assignment was approved by the Superintendent of Public Works March 26, 1917. The engineer's preliminary estimate for the derrick at Whitehall was \$3,745.70, the contractor's bid, \$5,500.20. Excess metal (Whitehall) to the value of \$1,092.00 has been authorized by the Canal Board. The value of work done at Whitehall during the year is \$6,170, done to date, the same.

W. L. Caler, Assistant Engineer, is in charge.

The location of this derrick was changed to a point 135 feet north of the warehouse.

Steel for this derrick arrived on May 8, 1918, the concrete foundation was finished on June 10, and on June 15 and 16 the derrick was erected. The steelwork was finished on June 22.

Terminal Contract No. 26 — Rouses Point

This contract is for constructing a pier and basin at Rouses Point. It was awarded to John E. Byron & Co., being signed on October 30, 1916. The engineer's preliminary estimate was \$51,200.00, the contractor's bid, \$55,678.50. The value of work done during the year is \$14,720, total done to date, \$18,730.

H. L. Clarke, Assistant Engineer, is in charge.

Excavation for the cribs was done with a derrick-boat. Eight cribs were launched and six completed and sunk into place. Operations were suspended for the winter on December 21, 1917, and no contract work has been done since that time.

NEW YORK RESIDENCY

Senior Assistant Engineer Edward Anderberg reports:

The New York residency has supervised the construction work at five Barge canal terminals in this city and progressed the plans for additional contracts in connection with these terminals and the three other unimproved terminal sites in the borough of Queens, as follows: Plans for contracts Nos. 38, 56, 207, 207-H and 207-P have been finished and the contracts let; plans, specifications and estimate for a freight-shed on the new pier at Greenpoint are 60 per cent completed; plans, specifications and estimate for repairs to the crib bulkhead, grading upland and constructing a freight-shed, at Long Island City are completed; and plans and estimate for dredging a terminal basin and constructing a bulkhead wall at Flushing are 60 per cent completed.

Plans were prepared and a bulkhead was constructed for retaining a proposed highway adjacent to Fort Tilden, Rockaway Point, L. I., under chapter 130, Laws of 1917. In connection with

this work, plans were prepared for the construction of a concrete pavement on the proposed highway.

A field survey, plans and estimates were made to determine the cost of a right of way and bridges on two alternative routes through the Rockaway peninsula for the proposed Jamaica bay-Peconic bay canal, as authorized by chapter 317, Laws of 1917.

Plans were prepared and construction work supervised in connection with the repairs to the landing pier at Hoffman's island, State Quarantine Station.

A survey and estimate was made for repairing two sea-walls at Orient Point, L. I.

Several surveys have been made for the Attorney-General in connection with the foreclosure of U. S. Deposit Fund mortgages.

Surveys have also been made in connection with twenty-one applications for grants of lands under water in various parts of the city.

Reports on the various contracts follow.

Terminal Contract No. 55 — Gowanus Bay

This contract is for constructing a pier, 150 ft. by 1,220 ft., dolphins, etc., at Gowanus bay, borough of Brooklyn. It was awarded to the Riverside Contracting Co., being signed on September 4, 1917. Construction work began October 5, 1917. The engineer's preliminary estimate was \$513,000.00, the contractor's bid, \$509,800.75. The contract price as modified by alteration No. 1 is \$508,400.75. The value of work done to date is \$157,330.

L. T. Howard, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board January 9, 1918, provides for the substitution of certain reused piles for new piles. It decreases the contract price by \$1,400.00.

The principal work done to date on this contract has been the driving of foundation piles, which have all been driven, except for bracing and fender piles, out to row 90, which is outshore about 900 feet, or about 300 feet inshore from the outer end of the pier. The longitudinal timber clamps, deck clamps and side caps have been placed to about row 75. Piles have been driven for dolphins along Columbia street and fender piles have been driven across the east pier seat.

The contractor's plant consists of a floating pile-driver, derrick lighter, compressor boat, tanks for timber treatment, etc.

The contract is 30.9 per cent completed.

Terminal Contract No. 56

This contract is for repairing Pier 5, East river, borough of Manhattan. It was awarded to I. J. Stander & Co., Inc., being signed on June 28, 1918. The engineer's preliminary estimate was \$20,400.00, the contractor's bid, \$27,159.60.

Construction work has not begun.

Terminal Contract No. 103-A

This contract is for furnishing, installing and testing two package-freight conveyors for Barge canal terminals. One of these is to be installed at some terminal in New York city. It was awarded to the Brown Portable Conveying Machinery Co., being signed on October 3, 1917. The engineer's preliminary estimate was \$3,900.00 each, the contractor's bid, \$4,100.00 each.

This conveyor has not been delivered. No payments have been made.

Terminal Contract No. 52 — Pier 6, East River

This contract is for widening and rebuilding Pier 6, East river. It was awarded to Kaufman & Garcey, being signed on July 27, 1916. Construction work began October 13, 1916. The engineer's preliminary estimate was \$89,974.00, the contractor's bid, \$91,317.75. The contract price as modified by alterations Nos. 1, 2, 3 and 4 is \$102,553.75. The value of work done during the year is \$43,770, total done to date, \$97,430. The amount paid on extra work orders during the year is \$2,391.37, total to date, \$2,726.04.

Ely Gamse, Assistant Engineer, is in charge.

Alteration No. 4, approved by the Canal Board December 4, 1917, eliminates pavement from the contract and changes the location of certain ducts for electric wires. It decreases the contract price by \$6,804.00.

An extra work order dated March 27, 1917, provides for removing certain rangers in the floor system of the old pier, the removal of which was not provided for in the original contract.

The final account, amounting to \$1,890.77, was approved by the Canal Board January 30, 1918.

An extra work order dated August 18, 1917, provides for the rental of street space adjacent to Pier 6, from May 1, 1917, to August 1, 1917. The final account, amounting to \$173.50, was approved by the Canal Board September 5, 1917.

An extra work order dated October 23, 1917, provides for the rental of street space adjacent to Pier 6, from August 1, 1917, to November 1, 1917. The final account, amounting to \$173.50, was approved by the Canal Board November 20, 1917.

An extra work order dated December 7, 1917, provides for replacing stone-block pavement back of the bulkhead wall.

An extra work order dated May 29, 1918, provides for the rental of street space adjacent to Pier 6, from November 1, 1917, to May 1, 1918. The final account, amounting to \$153.60, was approved by the Canal Board June 12, 1918.

The work during the past year involved building up the timber bents with new lumber, placing a new concrete deck, a crane rail, concrete footings for freight-shed and a new fender system. The work of rebuilding this pier has practically been completed. The remaining work comprises the placing of some bolts in the timber connections at low-water elevation.

The contractor's plant, which consisted of a pile-driver, locomotive crane, power saw, compressor plant, concrete mixer and tanks for treating lumber with wood preservative, has been removed.

The contract is 95.0 per cent completed.

Terminal Contract No. 207

This contract is for constructing a freight-shed and head-house on Pier 6, East river. It was awarded to I. J. Stander & Co., Inc., being signed on January 11, 1918. The engineer's preliminary estimate was \$133,500.00, the contractor's bid, \$128,250.01.

The subcontractor for structural steel work has prepared shop drawings preparatory to fabricating steel. No field work has been done.



BARGE CANAL TERMINAL AT PIER 6, E. R., NEW YORK

After the State acquired this property it was necessary to enlarge and partially rebuilt Pier 6. Contracts for a freight-house are now in force.

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Terminal Contract No. 207-H

This contract is for installing a heating system in the freight-shed on Pier 6, East river. It was awarded to Miller & Brady, Inc., being signed on March 22, 1918. The engineer's preliminary estimate was \$3,250.00, the contractor's bid, \$2,352.00.

Construction work has not begun.

Terminal Contract No. 207-P

This contract is for installing a plumbing and water-supply system in the freight-shed on Pier 6, East river. It was awarded to Jarcho Bros., Inc., being signed on April 16, 1918. The engineer's preliminary estimate was \$6,000.00, the contractor's bid, \$6,650.00.

Construction work has not yet begun.

Terminal Contract No. 105

This contract is for installing electric equipment for light, power and battery-charging, and auto-truck scales for Pier 6, East river. It was awarded to the Lord Electric Co., being signed on June 28, 1918. The engineer's preliminary estimate was \$17,742.40, the contractor's bid, \$16,000.50.

Construction work has not begun.

Terminal Contract No. 106

This contract is for furnishing fourteen two-ton steam tractor cranes for Barge canal terminals. Two of these are for Pier 6 and one for Long Island City. The contract was awarded to the John F. Byers Machine Co., being signed on February 14, 1918. The engineer's preliminary estimate was \$5,250.00 per crane, the contractor's bid, \$5,265.00 per crane. The contract price as modified by alteration No. 1 is \$5,515.00 per crane. The value of work done at Pier 6 to date is \$9,710.

Alteration No. 1, approved by the Canal Board March 27, 1918, provides for housing the fourteen cranes under this contract. It increases the contract price by \$250.00 per crane.

One crane for Pier 6, East river, was delivered on May 3 and the second on May 15. These cranes were satisfactorily tested, but are not complete, pending the receipt of some minor parts.

The crane for the Long Island City terminal has not been delivered to date.

Terminal Contract No. 19 — Greenpoint

This contract provides for dredging the terminal basin, constructing a new reinforced concrete bulkhead wall and pier, and repairing two existing timber piers and a timber bulkhead at the Greenpoint terminal, borough of Brooklyn. It was awarded to McHarg-Barton Co., being signed on November 24, 1916. Construction work began February 20, 1916. The engineer's preliminary estimate was \$193,500.00, the contractor's bid, \$207,383.00. The contract price as modified by alterations Nos. 1 and 2 is \$211,513.00. Excess quantities to the value of \$1,835.00 have been authorized by the Canal Board. The value of work done during the year is \$106,170, total done to date, \$131,450. The amount paid on extra work orders during the year is \$9,356.80, total to date, the same.

S. R. Bellows, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board on October 3, 1917, provides for cutting a traffic plate; for strengthening a girder on the south side of the new pier; for changing the location of a capstan recess and for applying a surface treatment for certain timbers. This alteration increases the amount of the contract by \$190.00.

Alteration No. 2, approved by the Canal Board on December 27, 1917, provides for removing additional old material and for placing pile dolphins to protect shallow areas. This alteration increases the amount of the contract by \$3,940.00.

An extra work order dated December 17, 1917, provides for surrounding certain foundation piles under the new pier with a timber frame and filling with concrete in bags and stone ballast, to provide lateral stiffness. The final account, amounting to \$9,356.80, was approved by the Canal Board June 12, 1918.

The terminal basin has been dredged to the required grade except for some small areas where the dredge failed to make the proper depth.

Except for some minor details, the new reinforced concrete bulkhead wall has been completed and repairs to the remaining crib bulkhead are well under way.



SITE OF BARGE CANAL TERMINAL AT GREENPOINT

This pier was repaired and made into a mooring pier. It lies to the south of the new pier.



The new pier is 40 per cent completed. The piles for the timber substructure have been practically all driven. The timber work for the substructure is over 50 per cent completed. All except 40 of the precast reinforced concrete foundation blocks have been made. Blocks have been set and reinforced concrete deck has been built out to row 14, which is one-third the distance out to the outshore end of the pier.

The repairs to the Dupont street pier are completed except for finishing some bolted connections of the timber-work around the low-water elevation.

The contractor's plant has consisted of a dipper-dredge and dump-scows, derrick lighter, floating pile-driver, compressor boat, concrete mixer and plant, etc.

The contract is 63.3 per cent completed.

Terminal Contract No. 38 — West 53d Street, North River

This contract is for constructing a pier at the foot of West 53d street, North river. It was awarded to I. J. Stander & Co., Inc., being signed on October 27, 1917. Construction work began November 1, 1917. The engineer's preliminary estimate was \$259,000.00, the contractor's bid, \$266,064.80. The contract price as modified by alteration No. 1 is \$265,503.16. The value of work done to date is \$51,490. The amount paid on extra work orders to date is \$405.00.

W. C. Bratton, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board June 19, 1918, changes the type of capstan settings, changes the layout of conduits for electric wires and changes certain column footings. It decreases the contract price by \$561.64.

An extra work order dated December 19, 1917, provides for the construction of an engineer's field office and rental of space occupied by it. The final account, amounting to \$405.00, was approved by the Canal Board March 20, 1918.

Piles were driven to about 300 feet outshore from the bulkhead and most of the timber framing was completed out to this point. Failure to get adequate deliveries of foundation piles caused delay in progressing the work.

The contractor's plant consisted of a floating pile-driver, a

compressor plant, a concrete mixer and tanks for the treatment of lumber with wood preservative.

The contract is 19.4 per cent completed.

Terminal Contract No. 44—Mott Haven

This contract is for excavating a terminal basin, constructing a dockwall, grading the upland and building approaches for a Barge canal terminal at Mott Haven, near East 138th street, borough of Bronx. It was awarded to Geo. W. Rogers & Co., Inc., being signed on June 8, 1917. Construction work began June 9, 1917. The engineer's preliminary estimate was \$170,300.00, the contractor's bid, \$193,651.00. The contract price as modified by alteration No. 1 is \$191,195.50. The value of work done during the year is \$100,060, total done to date, \$120,740.

W. C. Bratton, Assistant Engineer, was in charge until February 1, 1918. Since then, F. T. Lawton, Assistant Engineer, has been in charge.

Alteration No. 1, approved by the Canal Board December 19, 1917, provides for changing some details of the dockwall substructure. It decreases the contract price by \$2,455.50.

An extra work order dated April 23, 1918, provides for remodeling an existing brick building so that it can be used for an engineer's office.

Work was started June 9 by a clam-shell dredge. The excavation for the terminal basin was continued with one and two dredges to completion on March 21, 1918. Driving of the foundation and bracing piles for the bulkhead wall was almost completed. Considerable progress was made in framing the pile caps, longitudinal timbers and plank flooring of the substructure of the concrete wall. Riprap was placed under about one-half of the wall. Some backfill was placed as material was excavated for the upland grading.

The contractor's plant consisted of two dredges, dump-scows, two floating pile-drivers, derrick, etc.

The contract is 63.1 per cent completed.



BARGE CANAL TERMINAL AT GREENPOINT
New pier, 410 feet long by 90 feet wide. This terminal is situated adjacent to an important manufacturing section in Brooklyn and Long Island City.

Bulkhead at Rockaway Point, L. I.

(Chapter 130, Laws of 1917)

The construction work in connection with the highway adjacent to Fort Tilden, Rockaway Point, L. I., was as follows:

A contract for constructing a timber bulkhead to retain the filling for the highway was let on August 16, 1917, to A. M. Hazell, Inc., for \$40,835.35. Work was started on September 2, 1917, and carried on to completion on November 30, 1917. The final estimate amounted to \$39,949.31.

A contract for placing sand filling back of the bulkhead was made with the U. S. War Department in connection with filling being done by that department at Fort Tilden. Filling was done with two hydraulic dredges working on the State reservation occasionally in the months of August, September, October and November, 1917. A total of 91,934 cu. yds. of filling were placed at a total cost of \$11,055.76. The above work was completed satisfactorily by December 1.

H. W. Hale, Assistant Engineer, was in charge of the work connected with the highway adjacent to Fort Tilden.

Repairs to Landing Pier, Hoffman Island, Quarantine Station

This work was done by the Health Officer of the Port of New York from funds available out of operating income.

The contract was awarded to A. M. Hazell, Inc., on January 3, 1918, for \$3,387.00. Additional work was subsequently authorized, which provided for placing 17 additional fender piles, increasing the amount of the contract to \$4,152.00. In addition to the above an extra work order dated May 21, 1918, provides for making additional repairs not contemplated by the original contract, due to damage from storms and wood-boring sea worms. This work was done on a basis of cost plus 15 per cent.

Work was started on this contract on April 8, 1918, and was carried to completion on June 19. The final estimate is being prepared.

L. T. Howard, Assistant Engineer, was in charge.

THE FOLLOWING STATEMENTS SHOW THE NAMES, RANK AND COMPENSATION OF ENGINEERS EMPLOYED IN THE EASTERN DIVISION OF THE DEPARTMENT OF THE STATE ENGINEER AND SURVEYOR, TOGETHER WITH INCIDENTAL EXPENSES, FOR THE FISCAL YEAR ENDED JUNE 30, 1918.

Ordinary Repairs to Canals—Erie Canal

Chapter 725, Laws of 1915

ITEM	Total
<i>Incidental Expenses</i>	
Miscellaneous.....	\$1,812 00

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
Geo. D. Williams.....	Division engineer.....	\$4,800 per year	\$2,800 00	\$204 16	\$3,004 16
L. C. Hulburd.....	Senior assistant engineer.....	3,540 per year	357 50	21 46	378 96
R. S. Greenman.....	Senior assistant engineer.....	3,300 per year	2,040 00		2,040 00
Hattie A. Dell.....	Stenographer.....	1,200 per year	800 00		800 00
<i>Incidental Expenses</i>			\$5,997 50	\$225 62	\$6,223 12
Livery.....				\$1 50	
Postage.....				50 00	
Miscellaneous.....				320 26	
					371 76
Total.....					\$6,594 88

Ordinary Repairs to Canals—Champlain Canal

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
Geo. D. Williams.....	Division engineer.....	\$4,800 per year	\$1,200 00	\$97 86	\$1,297 86
R. S. Greenman.....	Senior assistant engineer.....	3,300 per year	1,040 00		1,040 00
L. C. Hulburd.....	Senior assistant engineer.....	3,540 per year	295 00	21 40	316 40
Hattie A. Dell.....	Stenographer.....	1,200 per year	400 00		400 00
C. T. Kniskern.....	Junior assistant engineer.....	1,800 per year	77 50		77 50
J. A. Waddell.....	Junior assistant engineer.....	1,800 per year	90 00		90 00
<i>Incidental Expenses</i>			\$3,102 50	\$119 26	\$3,221 76
Stationery and printing.....				\$37 65	
Postage.....				46 81	
Miscellaneous.....				98 90	
					183 36
Total.....					\$3,405 12

Construction of Barge Canal—Head Office Account

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
D. B. La Du	Special deputy state engineer	\$7,000 per year	\$3,500 02	\$808 06	\$4,308 08
W. B. Landreth	Deputy state engineer	5,000 per year		50 10	50 10
C. H. MacCulloch	Senior assistant engineer	3,540 per year	3,540 00	32 00	3,572 00
D. H. Daley	Senior assistant engineer	3,060 per year	2,610 42	23 58	2,634 00
R. S. Greenman	Senior assistant engineer	3,300 per year		976 84	976 84
J. M. C. Quarles de					
Quarles	Senior assistant engineer	3,060 per year	2,840 00		2,840 00
G. G. Underhill	Senior assistant engineer	3,300 per year	3,080 00	536 71	3,616 71
N. E. Whitford	Senior assistant engineer	3,300 per year	3,080 00	280 14	3,360 14
C. H. Wood	Senior assistant engineer	3,060 per year	407 99	29 42	437 41
Henry C. Allen	Consulting engineer	60 00 per day	600 00	63 77	663 77
Henry Goldmark	Consulting engineer	60 00 per day	660 00	126 11	786 11
E. E. Haskell	Consulting engineer	60 00 per day	840 00	145 85	985 85
E. C. Moore	Consulting engineer	60 00 per day	180 00	33 20	213 20
Joseph Ripley	Consulting engineer	7,200 per year	7,105 23	551 18	7,656 41
R. E. Phillips	Engineer of claims	4,200 per year	4,200 00	879 34	5,079 34
C. C. Egbert	Expert in electrical design	20 00 per day	230 00	73 02	303 02
W. E. Brower	Messenger	600 per year	48 71		48 71
G. W. Codwise	Confidential assistant	4,000 per year	3,500 00	63 50	3,563 50
Leland D. McCormick	Private secretary	2,400 per year		109 77	109 77
C. H. Waters	Private secretary	2,400 per year		307 84	307 84
John J. Allen	Canal clerk	1,800 per year	1,890 00		1,890 00
P. F. Burmaster	Office assistant	1,020 per year	153 55		153 55
C. B. Dunham, Jr.	Clerk	2,250 per year	2,112 50		2,112 50
John T. Gorman	Clerk	1,800 per year	1,770 00	85 56	1,855 56
J. C. Guffin	Clerk	1,620 per year	1,590 00		1,590 00
Jos. F. McManus	Messenger	900 per year	750 00		750 00
J. E. F. Minnock	Clerk	1,800 per year	1,770 00		1,770 00
Geo. T. Waterman	Clerk	1,200 per year	1,200 00		1,200 00
Mary Broughton	Stenographer	720 per year	660 00		660 00
Nelle Clark	Stenographer	1,200 per year	1,200 00		1,200 00
W. L. Collins	Stenographer	1,200 per year	146 67		146 67
Agnes Fogarty	Stenographer	1,200 per year	1,200 00		1,200 00
Ella Harrington	Stenographer	1,200 per year	100 00		100 00
Mary G. Harrington	Stenographer	1,200 per year	1,200 00		1,200 00
Grace Haswell	Stenographer	1,350 per year	1,350 00		1,350 00
Anna W. Newton	Stenographer	1,350 per year	1,350 00		1,350 00
John J. Tobin	Stenographer	1,800 per year	1,770 00		1,770 00
Jessie Weller	Stenographer	600 per year	446 45		446 45
H. Auerbach	Assistant engineer	2,208 per year	646 97		646 97
T. S. Bailey	Assistant engineer	2,580 per year	2,360 00		2,360 00
J. C. Bell	Assistant engineer	2,580 per year	135 24	1 26	136 50
H. W. Benedict	Assistant engineer	2,340 per year	747 00		747 00
F. E. Blake	Assistant engineer	2,580 per year	1,461 08		1,461 08
E. A. Brainerd	Assistant engineer	2,580 per year	284 35		284 35
H. E. Brainerd	Assistant engineer	2,580 per year	135 00		135 00
G. H. Briggs	Assistant engineer	2,340 per year	301 94	33 88	335 82
Clark Brown	Assistant engineer	2,208 per year	2,208 00		2,208 00
N. E. Cottrell	Assistant engineer	1,980 per year	1,398 60		1,398 60
G. E. Gibson	Assistant engineer	2,580 per year	1,509 50	73 81	1,583 31
M. W. Grimes	Assistant engineer	2,160 per year	2,055 00	181 83	2,236 83
F. B. Hall	Assistant engineer	2,580 per year	2,104 40	7 40	2,111 80
F. W. Harris	Assistant engineer	2,580 per year	304 31		304 31
A. G. Hayden	Assistant engineer	2,580 per year	747 42		747 42
Geo. D. Kellogg	Assistant engineer	2,580 per year	1,506 92		1,506 92
O. F. Lewis	Assistant engineer	2,208 per year	71 23		71 23
J. B. Maguire	Assistant engineer	2,340 per year	1,845 50		1,845 50
John McBride	Assistant engineer	2,340 per year	394 27	95	395 22
W. S. McDowell	Assistant engineer	2,580 per year	2,327 00		2,327 00
R. H. Merrill	Assistant engineer	2,580 per year	2,407 00	413 21	2,820 21
C. W. Morris, Jr.	Assistant engineer	2,160 per year	1,327 50		1,327 50
J. T. Murphy	Assistant engineer	2,340 per year	1,739 29		1,739 29
E. P. Neuschwander	Assistant engineer	2,580 per year	2,153 47	16 51	2,169 98
John P. Newton	Assistant engineer	2,340 per year	585 00		585 00
J. A. O'Donnell	Assistant engineer	2,160 per year	1,648 37		1,648 37
D. W. Overocker	Assistant engineer	2,208 per year	1,104 00		1,104 00
J. M. Prior	Assistant engineer	2,160 per year	138 38		138 38
C. E. Quimby	Assistant engineer	1,980 per year	644 03		644 03
E. G. Raynor	Assistant engineer	2,580 per year	2,283 00		2,283 00
L. S. Rickard	Assistant engineer	2,160 per year	2,115 00	7 64	2,122 64
H. J. Scheuermann	Assistant engineer	2,580 per year	2,205 99	20 02	2,226 01

Construction of Barge Canal—Head Office Account—(Cont'd)

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
E. G. Semon	Assistant engineer	\$2,340 per year	\$1,783 81	\$59 09	\$1,842 90
H. S. Sparr	Assistant engineer	2,160 per year	945 00		945 00
Rupert Sturtevant	Assistant engineer	2,580 per year	782 90	27 37	790 27
S. R. Tighe	Assistant engineer	1,980 per year	1,141 70		1,141 70
W. J. Weighmann	Assistant engineer	2,208 per year	1,283 00		1,283 00
L. C. West	Assistant engineer	2,340 per year	325 39		325 39
J. M. Angus	Junior assistant engineer	1,800 per year	136 61		136 61
Leroy Bamer	Junior assistant engineer	1,440 per year	696 77		696 77
J. F. Blaise	Junior assistant engineer	1,800 per year	824 31		824 31
C. D. Burrus	Junior assistant engineer	1,800 per year	1,050 00		1,050 00
W. A. Dawson	Junior assistant engineer	1,200 per year	385 48		385 48
Leroy Greenalch	Junior assistant engineer	1,800 per year	33 87		33 87
Bernard Gasier	Junior assistant engineer	1,320 per year	400 00		400 00
F. B. Faille	Junior assistant engineer	1,560 per year	226 46	4 55	231 01
A. Gordon	Junior assistant engineer	1,680 per year	373 04		373 04
W. R. Gordon	Junior assistant engineer	1,680 per year	85 81		85 81
J. S. Heath	Junior assistant engineer	1,320 per year	396 77		396 77
W. J. Henk	Junior assistant engineer	1,680 per year	1,445 51		1,445 51
W. J. Henry, Jr	Junior assistant engineer	1,200 per year	401 07		401 07
C. E. Hoehn	Junior assistant engineer	1,320 per year	330 00		330 00
E. Hulsapple	Junior assistant engineer	1,560 per year	431 10		431 10
J. S. Hyman	Junior assistant engineer	1,800 per year	495 97		495 97
G. B. Kelley	Junior assistant engineer	1,680 per year	1,440 00		1,440 00
H. C. Kelly	Junior assistant engineer	1,680 per year	219 03		219 03
C. T. Kniskern	Junior assistant engineer	1,800 per year	1,369 78		1,369 78
Jacob Labishiner	Junior assistant engineer	1,200 per year	960 83		960 83
J. P. Larsen	Junior assistant engineer	1,200 per year	87 09		87 09
Geo. D. Meer	Junior assistant engineer	1,800 per year	1,550 00	70 38	1,620 38
Charles Messina	Junior assistant engineer	1,560 per year	50 32		50 32
P. R. Murray	Junior assistant engineer	1,800 per year	1,590 00	9 62	1,599 62
H. S. Roberts	Junior assistant engineer	1,320 per year	330 00		330 00
Geo. L. Schillner	Junior assistant engineer	1,680 per year	1,570 00		1,570 00
Paul Scully	Junior assistant engineer	1,320 per year	1,320 00		1,320 00
W. L. Shahan	Junior assistant engineer	1,200 per year	361 08		361 08
R. B. Smith	Junior assistant engineer	1,800 per year	799 68		799 68
G. E. Sweet	Junior assistant engineer	1,560 per year	1,560 00		1,560 00
L. E. Turpitt	Junior assistant engineer	1,320 per year	1,041 94		1,041 94
F. M. Van Zile	Junior assistant engineer	1,680 per year	1,467 26		1,467 26
S. T. Vosburgh	Junior assistant engineer	1,680 per year	1,190 00	76 59	1,266 59
L. B. Westfall	Junior assistant engineer	1,800 per year	1,691 13		1,691 13
C. P. Wiweke	Junior assistant engineer	1,800 per year	955 64		955 64
M. E. Baker	Engineering assistant	1,020 per year	970 00	7 53	977 53
H. A. Dayton	Engineering assistant	840 per year	316 00		316 00
J. F. Duffy	Engineering assistant	1,080 per year	871 70		871 70
C. J. Grace, Jr	Engineering assistant	840 per year	140 00		140 00
A. E. Halligan	Engineering assistant	1,080 per year	45 00		45 00
C. L. Hawkins	Engineering assistant	840 per year	184 48		184 48
Wm. Leffler	Engineering assistant	840 per year	59 92		59 92
R. H. Shocum	Provisional engineering assistant	840 per year	21 00	4 60	25 60
W. C. Strecker	Engineering assistant	840 per year	9 03		9 03
E. V. Allendorph	Inspector of engineering works	1,560 per year	1,560 00		1,560 00
M. S. Bierce	Inspector of engineering works	1,560 per year	1,560 00		1,560 00
F. B. Kraft	Inspector of engineering works	1,560 per year	1,560 00		1,560 00
E. H. Wetsel	Inspector of engineering works	1,560 per year	1,560 00		1,560 00
G. C. Schaefer	Boatman	3 00 per day	288 00	104 15	392 15
Wm. J. Atkinson	Laborer	2 50 per day	912 50		912 50
John Cullen	Laborer	2 50 per day	780 00		780 00
James Daley	Laborer	2 50 per day	255 00		255 00
James Dolan	Laborer	2 50 per day	682 50		682 50
John Dooley	Laborer	2 50 per day	565 00		565 00
W. A. Doyle	Laborer	2 50 per day	30 00		30 00
Wm. Felstead	Laborer	2 50 per day	687 50		687 50
A. A. Finger	Laborer	2 50 per day	30 00		30 00
Joseph Habbinger	Laborer	2 50 per day	357 50		357 50
Sebastian Habbinger	Laborer	2 50 per day	460 00		460 00
David Horner	Laborer	2 50 per day	810 00		810 00
Henry Kling	Laborer	2 50 per day	65 00		65 00
J. M. MacDonald	Laborer	2 50 per day	780 00		780 00
Henry MacFarlane	Laborer	2 50 per day	95 00		95 00
G. F. Marcoux	Laborer	2 50 per day	672 50	8 17	680 67
Harry McMahon	Laborer	2 50 per day	35 00		35 00
Filadelfo Mondello	Laborer	2 50 per day	780 00		780 00

Construction of Barge Canal—Head Office Account—(Concl'd)

Chapter 147, Laws of 1903, amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
C. M. Peeson.....	Laborer.....	\$3 50 per day	\$300 00		\$300 00
Thomas Rattoone.....	Laborer.....	2 50 per day	770 00		770 00
W. J. Smith.....	Laborer.....	2 50 per day	912 50		912 50
H. J. Soules.....	Laborer.....	2 50 per day	780 00		780 00
Henry Strobel.....	Laborer.....	2 50 per day	780 00		780 00
M. J. Tanner.....	Laborer.....	2 50 per day	832 50		832 50
J. R. Van Schoonhoven.....	Laborer.....	2 50 per day	780 00		780 00
Edward Van Truen.....	Laborer.....	2 50 per day	720 00		720 00
S. J. Cleveland.....	Carpenter and model maker.....	3 50 per day	147 00		147 00
Sibella Carroll.....	Charwoman.....	480 per year	417 50		417 50
E. M. Chamberlain.....	Night watchman.....	960 per year	960 00		960 00
F. M. Hill.....	Title maker.....	1,560 per year	1,560 00		1,560 00
Theresa M. Stubbing.....	Telephone operator.....	840 per year	810 00		810 00
H. J. Richardson.....	Photographer.....	1,680 per year	36 13	\$35 31	71 44
Catherine Eyan.....	Charwoman.....	480 per year	33 33		33 33
Frank E. Davis.....	Chauffeur.....	1,650 per year	812 50	51 13	863 63
John J. Finn.....	Chauffeur.....	1,650 per year	818 75	213 95	1,032 70
Harvey W. Nutter.....	Chauffeur.....	1,650 per year	1,637 50	207 75	1,845 25
			\$161,519 99	\$6,814 69	\$168,334 68
<i>Incidental Expenses</i>					
Instruments, tools and appliances.....				\$238 23	
Office rent.....				3,763 24	
Fuel and light.....				45 36	
Stationery and printing.....				5,243 49	
Postage.....				1,750 44	
Telephone and telegraph.....				2,252 33	
Miscellaneous.....				12,127 83	
					25,490 42
Total.....					\$193,735 10

Construction of Barge Canal—Erie Canal

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
E. A. Lamb.....	Senior assistant engineer.....	\$3,300 per year	\$3,080 00	\$339 63	\$3,419 63
D. C. Wedgeworth.....	Senior assistant engineer.....	3,080 per year	2,012 58	143 37	2,155 95
Parkes D. Wendell.....	Estimate clerk.....	3,000 per year	3,000 00		3,000 00
G. P. Gleason.....	Stenographer to division engineer.....	2,100 per year	1,050 00		1,050 00
Edna M. Pickert.....	Stenographer.....	1,200 per year	1,183 33		1,183 33
Joseph L. Richards.....	Stenographer.....	1,200 per year	550 00		550 00
L. R. Spencer.....	Stenographer.....	900 per year	237 10		237 10
M. J. Sullivan.....	Stenographer.....	1,200 per year	600 00		600 00
A. G. Austin.....	Assistant engineer.....	1,980 per year	1,075 16	272 83	1,347 99
J. C. Bell.....	Assistant engineer.....	2,580 per year	1,471 01	112 38	1,583 39
W. C. Benedict.....	Assistant engineer.....	2,340 per year	954 24	232 45	1,186 69
G. A. Ensign.....	Assistant engineer.....	2,160 per year	1,208 91		1,208 91
F. W. Harris.....	Assistant engineer.....	2,580 per year	536 57	76 14	612 71
B. L. Holt.....	Assistant engineer.....	2,208 per year	454 66		454 66
M. E. James.....	Assistant engineer.....	2,580 per year	2,520 00	355 50	2,875 50
B. T. Kenyon.....	Assistant engineer.....	2,580 per year	2,440 00	639 82	3,099 82
H. C. Kline.....	Assistant engineer.....	2,340 per year	976 67	83 32	1,059 99
T. J. Lconie.....	Assistant engineer.....	1,980 per year	1,772 42		1,772 42
A. T. Mussi.....	Assistant engineer.....	2,340 per year	1,940 90	408 85	2,349 75
C. G. Ranney.....	Assistant engineer.....	2,530 per year	2,393 76	603 37	2,997 13
C. R. Waters.....	Assistant engineer.....	2,208 per year	184 00	13 65	197 65
T. L. Watkins.....	Assistant engineer.....	2,580 per year	1,035 00		1,035 00
L. C. West.....	Assistant engineer.....	2,208 per year	363 00	20 68	383 68
Leroy Bailey.....	Junior assistant engineer.....	1,200 per year	824 63		824 63

Construction of Barge Canal—Erie Canal—(Continued)

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
W. G. Baxter.....	Junior assistant engineer.....	\$1,200 per year	\$370 00		\$370 00
L. J. Bradley.....	Junior assistant engineer.....	1,800 per year	1,546 13		1,546 13
A. H. Charchian.....	Junior assistant engineer.....	1,200 per year	946 24		946 24
J. J. Carroll.....	Junior assistant engineer.....	1,320 per year	183 58		183 58
Robert E. Crowley.....	Junior assistant engineer.....	1,200 per year	384 19		384 19
E. F. Doucett.....	Junior assistant engineer.....	1,680 per year	1,540 00	\$31 01	1,571 01
L. W. Douglas.....	Junior assistant engineer.....	1,200 per year	548 35		548 35
H. F. Fagan.....	Junior assistant engineer.....	1,680 per year	390 00		390 00
John Fdelstein.....	Junior assistant engineer.....	1,440 per year	666 77		666 77
F. B. Faile.....	Junior assistant engineer.....	1,560 per year	1,065 38	6 25	1,071 60
F. E. Gillen.....	Junior assistant engineer.....	1,800 per year	1,751 94		1,751 94
David Gordon.....	Junior assistant engineer.....	1,200 per year	519 76		519 76
A. A. Griffin.....	Junior assistant engineer.....	1,320 per year	660 00		660 00
W. M. Griffith.....	Junior assistant engineer.....	1,800 per year	1,730 00	109 49	1,839 49
M. T. Harvey.....	Junior assistant engineer.....	1,200 per year	220 97		220 97
Samuel Jaffe.....	Junior assistant engineer.....	1,200 per year	90 86		90 86
H. W. Jewell.....	Junior assistant engineer.....	1,800 per year	1,711 80	45 57	1,757 50
W. G. Keeshan.....	Junior assistant engineer.....	1,110 per year	17 90		17 90
T. R. Kerslake.....	Junior assistant engineer.....	1,320 per year	160 54	1 79	162 29
C. T. McLean.....	Junior assistant engineer.....	1,110 per year	283 90		283 95
Wm. Mangen.....	Junior assistant engineer.....	1,440 per year	1,392 26		1,392 26
A. J. Mantica.....	Junior assistant engineer.....	1,650 per year	672 00		672 00
Charles Montag.....	Junior assistant engineer.....	1,560 per year	16 77		16 77
M. J. Quinn.....	Junior assistant engineer.....	1,320 per year	1,054 60	27 00	1,081 62
H. L. Ramage.....	Junior assistant engineer.....	1,200 per year	257 68		257 63
Frank C. Rogers.....	Junior assistant engineer.....	1,200 per year	110 97		110 97
T. H. Sherman.....	Junior assistant engineer.....	1,200 per year	46 67		46 67
Nathan Simon.....	Junior assistant engineer.....	1,200 per year	114 62		114 62
R. B. Smith.....	Junior assistant engineer.....	1,680 per year	650 32		650 32
W. C. Strecker.....	Junior assistant engineer.....	1,200 per year	853 87		853 87
J. A. Waddell.....	Junior assistant engineer.....	1,800 per year	16 77		16 77
C. A. Wilbur.....	Junior assistant engineer.....	1,800 per year	1,730 00	30 35	1,760 35
A. F. Bayly.....	Engineering assistant.....	960 per year	41 28		41 29
F. S. Bolotti.....	Engineering assistant.....	1,080 per year	997 38		997 39
R. B. Deutch.....	Engineering assistant.....	840 per year	551 30		551 35
A. K. Erb.....	Engineering assistant.....	840 per year	9 03		9 03
E. E. Fobes.....	Engineering assistant.....	840 per year	700 88		700 83
D. A. Gillette.....	Engineering assistant.....	840 per year	735 68		735 68
H. H. Gloser.....	Engineering assistant.....	840 per year	128 60		128 71
A. H. Goodwin.....	Engineering assistant.....	840 per year	241 61		241 61
G. Hinds.....	Engineering assistant.....	840 per year	833 50		833 50
J. B. Kinney.....	Engineering assistant.....	840 per year	184 33		184 33
J. C. Quinterro.....	Engineering assistant.....	840 per year	826 00		826 00
E. C. Reusswig.....	Engineering assistant.....	900 per year	300 00		300 00
T. K. Smith.....	Engineering assistant.....	840 per year	501 36		501 36
F. B. Stoddard.....	Engineering assistant.....	1,080 per year	840 30		840 32
Isaac Superman.....	Engineering assistant.....	840 per year	156 33		156 33
C. B. Telo.....	Engineering assistant.....	1,080 per year	1,030 00	24 27	1,054 27
George Terwilliger.....	Engineering assistant.....	1,020 per year	509 40		509 45
H. E. Thompson.....	Engineering assistant.....	840 per year	70 30		70 30
W. L. Weinbender.....	Engineering assistant.....	840 per year	210 00		210 00
L. W. Dcnnelly.....	Inspector of engineering works.....	1,560 per year	269 23		269 23
W. H. H. Klinkhart.....	Inspector of engineering works.....	1,560 per year	157 20		157 26
S. Y. MacGregor.....	Inspector of engineering works.....	1,560 per year	650 00		650 00
T. M. Oliver.....	Inspector of engineering works.....	1,560 per year	1,547 42		1,547 42
Howard S. Deal.....	Boatman.....	3 00 per day	330 00		330 00
Harold Folmsbee.....	Boatman.....	3 00 per day	782 50		782 50
J. Hayes.....	Boatman.....	3 00 per day	543 00		543 00
John Keenan.....	Boatman.....	3 00 per day	234 00		234 00
R. Murray.....	Boatman.....	3 00 per day	240 00		240 00
G. C. Schaefer.....	Boatman.....	3 00 per day	96 00	9 53	105 53
A. B. Starin.....	Boatman.....	3 00 per day	873 00		873 00
Peter Barton.....	Laborer.....	2 50 per day	32 50		32 50
Archie Bellrose.....	Laborer.....	2 50 per day	37 50		37 50
Sylvester Cogley.....	Laborer.....	2 50 per day	252 50		252 50
Raymond Comrie.....	Laborer.....	2 50 per day	472 50		472 50
H. L. Crouse.....	Laborer.....	2 50 per day	660 00		660 00
Thomas Dalton.....	Laborer.....	2 50 per day	737 50		737 50
Wm. DeForest.....	Laborer.....	2 50 per day	750 00		750 00
R. H. Kay.....	Laborer.....	2 50 per day	750 00		750 00
John Lavery.....	Laborer.....	2 50 per day	912 50		912 50
L. L. Lounsbery.....	Laborer.....	2 50 per day	192 50		192 50

Construction of Barge Canal—Erie Canal—(Concluded)

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
T. F. Madden.....	Laborer.....	\$2 50 per day	\$372 50		\$372 50
Harvey Martin.....	Laborer.....	2 50 per day	272 50		272 50
M. Mets.....	Laborer.....	2 50 per day	862 50		862 50
G. W. Olmstead.....	Laborer.....	2 50 per day	35 00		35 00
Paul Sajta.....	Laborer.....	2 50 per day	765 00		765 00
John Shook.....	Laborer.....	2 50 per day	67 50		67 50
A. W. Wright.....	Laborer.....	2 50 per day	32 50		32 50
Stephen Zierak.....	Laborer.....	2 50 per day	177 50		177 50
H. J. Richardson.....	Photographer.....	1,680 per year	896 83	\$59 96	956 79
Harry Bishton.....	Gage reader.....	14 per month	168 00		168 00
C. G. Boyd.....	Gage reader.....	14 per month	14 00		14 00
Guy Bracebridge.....	Gage reader.....	5 per month	30 00		30 00
Sanford Bracebridge.....	Gage reader.....	5 per month	30 00		30 00
H. C. Dowling.....	Gage reader.....	7 per month	84 00		84 00
P. C. Earl.....	Gage reader.....	7 per month	84 00		84 00
Charles Hansen.....	Gage reader.....	7 per month	7 00		7 00
Lloyd Kast.....	Gage reader.....	7 per month	84 00		84 00
Richard Kilmartin.....	Gage reader.....	7 per month	84 00		84 00
Clark Kyser.....	Gage reader.....	7 per month	70 00		70 00
Peter Lebeis.....	Gage reader.....	7 per month	63 00		63 00
Oscar Lockwood.....	Gage reader.....	7 per month	84 00		84 00
C. F. Loring.....	Gage reader.....	7 per month	84 00		84 00
Joseph Millington.....	Gage reader.....	12 per month	24 00		24 00
H. Moyer.....	Gage reader.....	5 per month	55 00		55 00
James Murphy.....	Gage reader.....	9 per month	94 00		94 00
Fred Pentland.....	Gage reader.....	9 per month	94 00		94 00
P. C. Pickard.....	Gage reader.....	7 per month	56 00		56 00
J. Reepmeyer, Jr.....	Gage reader.....	10 per month	120 00		120 00
Eugene Snell.....	Gage reader.....	7 per month	7 00		7 00
A. M. Spencer.....	Gage reader.....	7 per month	56 00		56 00
Wm. C. Vrooman.....	Gage reader.....	7 per month	11 29		11 29
Minnie E. White.....	Gage reader.....	7 per month	84 00		84 00
Robert Wilson.....	Gage reader.....	10 per month	120 00		120 00
C. E. Wing.....	Gage reader.....	10 per month	120 00		120 00
C. W. Young.....	Gage reader.....	14 per month	112 00		112 00
Harry J. Young.....	Gage reader.....	7 per month	7 00		7 00
W. E. Young.....	Gage reader.....	7 per month	56 00		56 00

Incidental Expenses

	\$79,047 44	\$3,667 30	\$82,714 74
Instruments, tools and appliances.....		\$8 35	
Office rent.....		1,904 00	
Fuel and light.....		399 21	
Stationery and printing.....		14 86	
Postage.....		129 92	
Telephone and telegraph.....		592 81	
Miscellaneous.....		2,104 23	
			5,153 38
Total.....			\$87,868 12

Construction of Barge Canal—Champlain Canal

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
John Schade.....	Cashier.....	\$2,100 per year	\$1,925 00		\$1,925 00
J. E. Phinney.....	Photographer.....	1,320 per year	1,000 00		1,000 00
W. L. Caler.....	Assistant engineer.....	2,580 per year	370 50	\$9 34	379 84
C. A. Curtis.....	Assistant engineer.....	2,580 per year	2,397 00	345 25	2,742 25
J. B. Foote.....	Assistant engineer.....	2,340 per year	2,340 00	1,598 33	3,938 33
R. G. Gibson.....	Assistant engineer.....	2,160 per year	1,065 00	17 69	1,082 69

Construction of Barge Canal—Champlain Canal—(Continued)

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
R. D. Hayes	Assistant engineer	\$3,580 per year	\$3,012 50	\$1,120 77	\$3,133 27
John McBride	Assistant engineer	2,340 per year	1,322 99	174 77	1,497 76
T. L. Watkins	Assistant engineer	2,580 per year	215 00		215 00
H. I. Bristol	Junior assistant engineer	1,200 per year	930 00		930 00
D. E. Damon	Junior assistant engineer	1,800 per year	1,701 77		1,701 77
G. E. Deutschbein	Junior assistant engineer	1,800 per year	1,730 00		1,730 00
Samuel Jaffe	Junior assistant engineer	1,200 per year	70 00		70 00
B. A. Krottinger	Junior assistant engineer	1,680 per year	126 58		126 58
John F. Larson	Junior assistant engineer	1,320 per year	783 74		783 74
J. H. McEntee	Junior assistant engineer	1,320 per year	517 00		517 00
G. C. Nash	Junior assistant engineer	1,200 per year	183 87		183 87
Mott Palmer	Junior assistant engineer	1,800 per year	1,770 00	679 91	2,449 91
T. H. Sherman	Junior assistant engineer	1,200 per year	330 00		330 00
J. P. Walsh	Junior assistant engineer	1,440 per year	120 00		120 00
W. J. Curtis	Engineering assistant	1,080 per year	867 00		867 00
Harry A. Dayton	Engineering assistant	840 per year	140 00		140 00
H. G. Gunther	Engineering assistant	840 per year	135 68		185 68
Nathaniel Merriman	Engineering assistant	840 per year	102 66		102 66
Geo. A. Rogers	Engineering assistant	1,080 per year	835 00		835 00
Thomas Ryan, Jr.	Engineering assistant	1,020 per year	639 15		639 15
Geo. Terwilliger	Engineering assistant	1,020 per year	21 94		21 94
F. W. Yates	Engineering assistant	840 per year	235 00		235 00
F. G. Tilton	Inspector of engineering works	1,560 per year	410 97		410 97
B. K. Ellis	Boatman	3 00 per day	791 50		791 50
Willard Joslin	Boatman	3 00 per day	264 00		264 00
John Keenan	Boatman	3 00 per day	60 00		60 00
J. C. Leyland	Boatman	3 00 per day	1,017 00		1,017 00
M. McConnell	Boatman	3 00 per day	645 00		645 00
G. E. McElroy	Boatman	3 00 per day	495 00		495 00
N. H. McMahon	Boatman	3 00 per day	1,095 00		1,095 00
Harry McMahon	Boatman	3 00 per day	548 00		548 00
Ephraim Newland	Boatman	3 00 per day	189 00		189 00
Edward Ryan	Boatman	3 00 per day	945 00		945 00
G. C. Schaefer	Boatman	3 00 per day	532 00		532 00
F. H. Crandall	Laborer	2 50 per day	732 50		732 50
Fred Hilfinger	Laborer	2 50 per day	732 50		732 50
James Hustand	Laborer	2 50 per day	300 00		300 00
M. Killeen	Laborer	2 50 per day	82 50		82 50
James Malia	Laborer	2 50 per day	897 50		897 50
Percy Mattimore	Laborer	2 50 per day	375 00		375 00
John McCarthy, Jr.	Laborer	2 50 per day	395 00		395 00
Lewis Saunders	Laborer	2 50 per day	40 00		40 00
G. M. Weaver	Laborer	2 50 per day	515 00		515 00
Thos. Welch	Laborer	2 50 per day	222 50		222 50
H. J. Richardson	Photographer	1,680 per year	521 83	19 65	541 48
W. D. Barber	Gage reader	7 per month	70 00		70 00
E. H. Bowker	Gage reader	7 per month	56 00		56 00
F. E. Chapman	Gage reader	8 per month	88 00		88 00
Chas. Cheney	Gage reader	7 per month	84 00		84 00
S. L. Cluett	Gage reader	7 per month	35 00		35 00
J. H. Donnelly	Gage reader	7 per month	84 00		84 00
G. E. Fifield	Gage reader	7 per month	84 00		84 00
A. B. Fischer	Gage reader	7 per month	56 00		56 00
W. B. Dunstan	Gage reader	7 per month	77 00		77 00
John T. Morris	Gage reader	8 per month	96 00		96 00
G. F. Mayhew	Gage reader	8 per month	8 00		8 00
Henry Palmer	Gage reader	7 per month	14 00		14 00
Byron Stedman	Gage reader	7 per month	84 00		84 00
F. H. Wells	Gage reader	7 per month	84 00		84 00

Incidental Expenses

	\$36,964 18	\$3,965 71	\$40,929 89
Office rent		\$570 00	
Fuel and light		98 31	
Stationery and printing		17 60	
Postage		153 84	
Telephone and telegraph		300 10	
Miscellaneous		1,685 13	
			2,824 98
Total			\$43,754 87

Construction of Barge Canal Terminals

Chapter 746, Laws of 1911, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
D. B. La Du.....	Special deputy state engineer.....	\$7,000 per year	\$3,499 98	\$625 58	\$4,125 56
Edward Anderberg.....	Senior assistant engineer.....	3,300 per year	2,605 48	236 46	2,841 94
A. W. Conner.....	Senior assistant engineer.....	3,060 per year	2,840 00	161 68	3,001 68
D. H. Daley.....	Senior assistant engineer.....	3,060 per year	229 58		229 58
R. S. Greenman.....	Senior assistant engineer.....	3,300 per year		114 61	114 61
Maurice Williams.....	Senior assistant engineer.....	2,820 per year	2,247 41	540 37	2,787 78
C. H. Wood.....	Senior assistant engineer.....	3,060 per year	1,086 98	89 09	1,176 07
B. F. Cresson.....	Expert on terminal construction.....	40 00 per day	1,240 00	135 31	1,375 31
E. P. Goodrich.....	Expert on terminal construction.....	40 00 per day	1,240 00	119 61	1,359 61
H. McL. Harding.....	Expert on terminal construction.....	40 00 per day	1,120 00	118 92	1,238 92
G. W. Codwise.....	Confidential assistant.....	4,000 per year	301 07	134 32	435 39
L. D. McCormick.....	Private secretary.....	2,400 per year		55 83	55 83
C. R. Waters.....	Private secretary.....	2,400 per year		277 42	277 42
W. S. Ryan.....	Confidential clerk and stenographer.....	2,400 per year		32 05	32 05
Fred C. Stahl.....	Bookkeeper.....	1,800 per year	1,800 00		1,800 00
C. B. Dunham, Jr.....	Clerk.....	2,250 per year		18 06	18 06
J. E. Stewart.....	Clerk.....	1,800 per year	1,800 00		1,800 00
G. P. Gleason.....	Stenographer to division engineer.....	2,100 per year	1,050 00		1,050 00
P. J. Gaffey.....	Stenographer.....	1,200 per year	374 19		374 19
Emily P. Hofman.....	Stenographer.....	780 per year	390 00		390 00
J. E. Phinney.....	Stenographer.....	1,220 per year	250 00		250 00
M. J. Sullivan.....	Stenographer.....	1,200 per year	600 00		600 00
Henry Auerbach.....	Assistant engineer.....	2,208 per year	89 03		89 03
S. R. Bellows.....	Assistant engineer.....	2,580 per year	2,440 00	106 84	2,546 84
W. C. Benedict.....	Assistant engineer.....	2,340 per year	6 29	5 95	12 24
F. E. Blake.....	Assistant engineer.....	2,580 per year	1,118 92		1,118 92
W. C. Bratton.....	Assistant engineer.....	2,580 per year	2,283 00	129 75	2,412 75
P. H. Budd.....	Assistant engineer.....	2,208 per year	818 19		818 19
W. L. Cser.....	Assistant engineer.....	2,580 per year	2,069 50	444 82	2,514 32
H. L. Clarke.....	Assistant engineer.....	2,340 per year	1,264 35	196 51	1,460 86
Horace Corbin.....	Assistant engineer.....	2,580 per year	2,320 71		2,320 71
N. E. Cottrill.....	Assistant engineer.....	1,980 per year	581 40		581 40
C. A. Curtis.....	Assistant engineer.....	2,580 per year	43 00	22 46	65 46
J. B. Doughty.....	Assistant engineer.....	2,160 per year	2,055 00		2,055 00
G. A. Ensign.....	Assistant engineer.....	2,160 per year	176 90		176 90
Ely Gamse.....	Assistant engineer.....	2,580 per year	2,353 71	107 43	2,461 14
R. G. Gibson.....	Assistant engineer.....	1,980 per year	990 00	78 70	1,068 70
H. W. Hale.....	Assistant engineer.....	2,160 per year	42 93		42 93
F. B. Hall.....	Assistant engineer.....	2,580 per year	153 90		153 90
F. W. Harris.....	Assistant engineer.....	2,580 per year	543 52	85 95	629 47
A. G. Hayden.....	Assistant engineer.....	2,580 per year	1,232 67		1,232 67
R. D. Hayes.....	Assistant engineer.....	2,580 per year	507 50	47 47	554 97
L. T. Howard.....	Assistant engineer.....	2,580 per year	1,868 11	134 72	2,002 83
H. C. Kline.....	Assistant engineer.....	2,580 per year	1,312 83	31 76	1,344 59
F. T. Lawton.....	Assistant engineer.....	2,340 per year	1,193 93	31 30	1,225 23
T. J. Loonie.....	Assistant engineer.....	1,980 per year	149 03		149 03
J. B. Maguire.....	Assistant engineer.....	2,340 per year	373 50		373 50
C. W. Morris, Jr.....	Assistant engineer.....	2,160 per year	667 50	9 07	676 57
A. P. Mussi.....	Assistant engineer.....	2,340 per year	278 10	20 25	298 35
E. P. Neuschwander.....	Assistant engineer.....	2,580 per year	426 53		426 53
J. A. O'Donnell.....	Assistant engineer.....	2,160 per year	346 63		346 63
E. C. Olcott.....	Assistant engineer.....	2,208 per year	2,208 00		2,208 00
C. E. Quimby.....	Assistant engineer.....	2,160 per year	947 90		947 90
A. C. Richards.....	Assistant engineer.....	2,580 per year	2,407 00		2,407 00
H. J. Scheuermann.....	Assistant engineer.....	2,580 per year	374 01	5 16	379 17
E. G. Semon.....	Assistant engineer.....	2,340 per year	481 64		481 64
H. S. Sparr.....	Assistant engineer.....	2,160 per year	542 90		542 90
R. Sturtevant.....	Assistant engineer.....	2,580 per year	1,817 10	175 57	1,992 67
S. R. Tighe.....	Assistant engineer.....	1,980 per year	838 30		838 30
C. R. Waters.....	Assistant engineer.....	2,208 per year	101 10	33 97	135 07
T. L. Watkins.....	Assistant engineer.....	2,580 per year	1,270 00	20 16	1,290 16
W. J. Weigmann.....	Assistant engineer.....	2,208 per year	368 00		368 00
L. C. West.....	Assistant engineer.....	2,340 per year	845 15		845 15
H. T. Arnold.....	Junior assistant engineer.....	1,800 per year	1,115 35		1,115 35
LeRoy Bailey.....	Junior assistant engineer.....	1,200 per year	65 37		65 37
LeRoy Bamer.....	Junior assistant engineer.....	1,440 per year	60 00		60 00
J. F. Blaise.....	Junior assistant engineer.....	1,800 per year	404 03		404 03
J. H. Bovier.....	Junior assistant engineer.....	1,800 per year	14 51		14 51
R. E. Crowley.....	Junior assistant engineer.....	1,200 per year	131 94		131 94

Construction of Barge Canal Terminals— (Continued)

Chapter 746, Laws of 1911, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
J. A. Daly.....	Junior assistant engineer.....	\$1,320 per year	\$1,320 00		\$1,320 00
W. A. Dawson.....	Junior assistant engineer.....	1,200 per year	535 06		535 06
L. A. Denner, Jr.....	Junior assistant engineer.....	1,440 per year	1,370 00		1,370 00
J. Edelstein.....	Junior assistant engineer.....	1,440 per year	715 23		715 23
E. J. Donlon.....	Junior assistant engineer.....	1,110 per year	805 44		805 44
B. Gazier.....	Junior assistant engineer.....	1,320 per year	850 00		850 00
David Gordon.....	Junior assistant engineer.....	1,200 per year	53 33		53 33
A. E. Green.....	Junior assistant engineer.....	1,800 per year	308 00		308 00
LeRoy Greenalch.....	Junior assistant engineer.....	1,800 per year	643 55		643 55
J. E. Hall.....	Junior assistant engineer.....	1,800 per year	1,730 00		1,730 00
M. T. Harvey.....	Junior assistant engineer.....	1,200 per year	29 03		29 03
J. S. Heath.....	Junior assistant engineer.....	1,320 per year	579 03		579 03
D. L. Hendler.....	Junior assistant engineer.....	1,110 per year	608 21		608 21
W. J. Henk.....	Junior assistant engineer.....	1,560 per year	94 49		94 49
N. D. Hyde.....	Junior assistant engineer.....	1,560 per year	260 00		260 00
E. Hulsapple.....	Junior assistant engineer.....	1,560 per year	78 00		78 00
J. S. Hyman.....	Junior assistant engineer.....	1,800 per year	680 00	\$16 45	696 45
Samuel Jaffe.....	Junior assistant engineer.....	1,200 per year	307 20		307 20
Harry Kabak.....	Junior assistant engineer.....	1,200 per year	586 24		586 24
C. F. Keale.....	Junior assistant engineer.....	1,440 per year	838 62		838 62
W. G. Keshan.....	Junior assistant engineer.....	1,200 per year	1,033 79		1,033 79
W. Kemp, 2d.....	Junior assistant engineer.....	1,560 per year	712 90		712 90
B. A. Krottinger.....	Junior assistant engineer.....	1,560 per year	286 00		286 00
S. Levine.....	Junior assistant engineer.....	1,680 per year	95 45		95 45
J. H. McIntee.....	Junior assistant engineer.....	1,440 per year	245 80		245 80
G. D. Meer.....	Junior assistant engineer.....	1,680 per year	70 00		70 00
Chas. Messina.....	Junior assistant engineer.....	1,560 per year	699 77		699 77
Chas. Montag.....	Junior assistant engineer.....	1,680 per year	718 67		718 67
D. C. Ogsbury.....	Junior assistant engineer.....	1,800 per year	1,770 00		1,770 00
M. J. Quinn.....	Junior assistant engineer.....	1,320 per year	75 46	14 79	90 25
W. L. Shahan.....	Junior assistant engineer.....	1,200 per year	55 59		55 59
T. H. Sherman.....	Junior assistant engineer.....	1,200 per year	200 00		200 00
R. B. Smith.....	Junior assistant engineer.....	1,680 per year	280 00	7 29	287 29
Isac Spahn.....	Junior assistant engineer.....	1,200 per year	1,147 68		1,147 68
Isaac Stern.....	Junior assistant engineer.....	1,320 per year	1,014 51		1,014 51
L. E. Turpit.....	Junior assistant engineer.....	1,200 per year	55 59		55 59
F. M. Van Zile.....	Junior assistant engineer.....	1,560 per year	102 74		102 74
L. B. Westfall.....	Junior assistant engineer.....	1,800 per year	108 87		108 87
J. H. Williams.....	Junior assistant engineer.....	1,560 per year	872 26		872 23
C. P. Wiweke.....	Junior assistant engineer.....	1,800 per year	844 36		844 36
F. A. Belotti.....	Engineering assistant.....	1,080 per year	21 00		21 00
J. F. Duffy.....	Engineering assistant.....	1,080 per year	173 30		173 30
W. R. Glock.....	Engineering assistant.....	900 per year	147 58		147 58
H. H. Glosser.....	Engineering assistant.....	900 per year	377 90		377 90
A. E. Halligan.....	Engineering assistant.....	1,080 per year	1,000 00		1,000 00
Joseph Hoehlein.....	Engineering assistant.....	840 per year	66 84		66 84
G. W. Nostrand.....	Engineering assistant.....	840 per year	21 00		21 00
J. C. Quinterro.....	Engineering assistant.....	840 per year	14 00		14 00
J. J. Raup.....	Engineering assistant.....	1,080 per year	548 71		548 71
F. B. Stoddard.....	Engineering assistant.....	1,080 per year	159 68		159 68
C. B. Tebo.....	Engineering assistant.....	1,080 per year	15 00		15 00
G. Terwilliger.....	Engineering assistant.....	1,080 per year	513 61		513 61
T. J. Torpy.....	Engineering assistant.....	840 per year	45 16		45 16
L. W. Donnelly.....	Inspector of engineering works.....	1,560 per year	16 77		16 77
W. H. H. Klinkhart.....	Inspector of engineering works.....	1,560 per year	1,402 74		1,402 74
H. Kramer.....	Inspector of engineering works.....	1,560 per year	1,021 70		1,021 70
T. M. Oliver.....	Inspector of engineering works.....	1,560 per year	12 58		12 58
A. M. Wait.....	Inspector of engineering works.....	1,560 per year	1,056 77		1,056 77
George Alexander.....	Boatman.....	3 00 per day	936 00		936 00
A. A. Boles.....	Boatman.....	3 00 per day	906 00		906 00
Louis Cicio.....	Boatman.....	3 00 per day	711 00		711 00
Ruby Cohen.....	Boatman.....	3 00 per day	887 00		887 00
Walter Cornany.....	Boatman.....	3 00 per day	210 00		210 00
Harold Folmsbee.....	Boatman.....	3 00 per day	27 00		27 00
L. Goodman.....	Boatman.....	3 00 per day	414 00		414 00
H. D. Horning.....	Boatman.....	3 00 per day	42 00		42 00
J. A. Jacobson.....	Boatman.....	3 00 per day	1,056 00		1,056 00
John Keenan.....	Boatman.....	3 00 per day	168 00		168 00
J. J. Kelly.....	Boatman.....	3 00 per day	1,086 00		1,086 00
E. W. Kelly.....	Boatman.....	3 00 per day	1,092 00		1,092 00
W. B. Rowland.....	Boatman.....	3 00 per day	177 00		177 00

Construction of Barge Canal Terminals— (Concluded)

Chapter 746 Laws of 1911, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
M. J. Sims.....	Boatman.....	\$3 00 per day	\$358 00		\$358 00
A. B. Starin.....	Boatman.....	3 00 per day	48 00		48 00
J. W. Turner.....	Boatman.....	3 00 per day	795 00		795 00
Bernard Waage.....	Boatman.....	3 00 per day	558 00		558 00
Archie Bellrose.....	Laborer.....	2 50 per day	377 50		377 50
Sylvester Cogley.....	Laborer.....	2 50 per day	142 50		142 50
Walter Corman.....	Laborer.....	2 50 per day	532 50		532 50
Thos. Dalton.....	Laborer.....	2 50 per day	47 50		47 50
Harry E. Dayton.....	Laborer.....	2 50 per day	35 00		35 00
Wm. De Forest.....	Laborer.....	2 50 per day	22 50		22 50
B. K. Ellis.....	Laborer.....	2 50 per day	30 00		30 00
P. F. Fitzgerald.....	Laborer.....	2 50 per day	755 00		755 00
Chas. Girard.....	Laborer.....	2 50 per day	907 50		907 50
James Hopkins.....	Laborer.....	2 50 per day	810 00		810 00
T. F. Madden.....	Laborer.....	2 50 per day	40 00		40 00
Harvey Martin.....	Laborer.....	2 50 per day	20 00		20 00
Geo. Reuling.....	Laborer.....	2 50 per day	845 00		845 00
Paul Sajta.....	Laborer.....	2 50 per day	22 50		22 50
J. R. Van Schoonhoven.....	Laborer.....	2 50 per day		\$36 15	26 15
Gilbert Venter.....	Laborer.....	2 50 per day	912 50		912 50
Thos. Welch.....	Laborer.....	2 50 per day	42 50		42 50
H. J. Richardson.....	Photographer.....	1,680 per year	178 33	94 33	272 66
F. E. Davis.....	Chauffeur.....	1,650 per year	835 00	224 31	1,049 31
J. J. Finn.....	Chauffeur.....	1,650 per year	818 75	167 59	986 34
Harvey W. Nutter.....	Chauffeur.....	1,630 per year		97 03	97 03
			\$111,084 49	\$4,995 11	\$116,079 60
<i>Incidental Expenses</i>					
Instruments, tools and appliances.....				\$28 24	
Office rent.....				4,461 66	
Fuel and light.....				248 83	
Stationery and printing.....				1,503 88	
Postage.....				110 18	
Telephone and telegraph.....				663 53	
Express and freight.....				46 45	
Miscellaneous.....				4,890 25	
					11,958 02
Total.....					\$128,037 62

Bridge Designers, Engineers, Etc.

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
H. E. Brainard.....	Assistant engineer.....	\$2,580 per year	\$1,830 00	\$69 58	\$1,839 58
<i>Incidental Expenses</i>					
Postage.....					100 00
Total.....					\$1,969 53

High Street Bridge, Cohoes

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
H. W. Benedict.....	Assistant engineer.....	\$2,208 per year	\$92 00		\$92 00
F. B. Hall.....	Assistant engineer.....	2,580 per year	50 17		50 17
L. E. Turpit.....	Junior assistant engineer.....	1,200 per year	16 67		16 67
Total.....			\$158 84		\$158 84

Sea-wall, Orient Point, L. I.

Chapter 428, Laws of 1913

NAME	Rank	Rate of compensation	Services	Travel	Total
Edward Anderberg.....	Senior assistant engineer.....	\$3,300 per year	\$18 33	\$4 45	\$22 78

Blue Line Surveys

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
W. C. Benedict.....	Assistant engineer.....	\$2,340 per year	\$228 34	\$35 37	\$263 71
H. W. Benedict.....	Assistant engineer.....	208 per year	184 06		184 06
G. A. Ensign.....	Assistant engineer.....	160 per year	605 80		605 80
Edwin Hilborn.....	Assistant engineer.....	380 per year	1,922 00	291 15	2,213 15
F. W. Harris.....	Assistant engineer.....	380 per year	696 61		696 61
R. L. Holt.....	Assistant engineer.....	308 per year	534 79		534 79
O. F. Lewis.....	Assistant engineer.....	2,140 per year	2,147 77	174 20	2,321 97
T. J. Loonie.....	Assistant engineer.....	1,080 per year	58 55	13 57	58 55
C. G. Ranney.....	Assistant engineer.....	1,080 per year	44 24		57 81
C. R. Waters.....	Assistant engineer.....	2,208 per year	729 87	228 31	958 18
A. F. Bayly.....	Junior assistant engineer.....	1,200 per year	394 97		394 97
F. C. Bedell.....	Junior assistant engineer.....	1,200 per year	141 29		141 29
J. H. Bovier.....	Junior assistant engineer.....	1,200 per year	709 67		709 67
C. D. Burrus.....	Junior assistant engineer.....	1,200 per year	750 00		750 00
A. E. Carrere.....	Junior assistant engineer.....	1,080 per year	515 14		515 14
J. J. Carroll.....	Junior assistant engineer.....	1,110 per year	750 75		50 75
A. H. Charchian.....	Junior assistant engineer.....	960 per year	78 06		78 06
L. E. Du Bois.....	Junior assistant engineer.....	1,200 per year	196 66		196 66
F. B. Faillie.....	Junior assistant engineer.....	1,560 per year	130 00		130 00
L. E. Fields.....	Junior assistant engineer.....	1,200 per year	229 08		229 03
I. Finkelstein.....	Junior assistant engineer.....	1,200 per year	170 00		170 00
Geo. Fuller.....	Junior assistant engineer.....	1,800 per year	616 94		616 94
A. T. Giddings.....	Junior assistant engineer.....	1,500 per year	1,396 77	6 59	1,403 36
F. B. Gifford.....	Junior assistant engineer.....	1,200 per year	1,086 77		1,083 77
A. Gordon.....	Junior assistant engineer.....	1,680 per year	398 62		398 62
David Gordon.....	Junior assistant engineer.....	1,200 per year	304 30		304 30
H. W. Jewell.....	Junior assistant engineer.....	1,680 per year	18 07		18 07
T. R. Kerslake.....	Junior assistant engineer.....	1,320 per year	85 17		85 17
B. A. Krotzinger.....	Junior assistant engineer.....	1,680 per year	1,172 23		1,172 23
Samuel Levine.....	Junior assistant engineer.....	1,680 per year	1,121 20	39 58	1,160 78
Wm. Mangan.....	Junior assistant engineer.....	1,320 per year	17 74		17 74
W. N. Niles.....	Junior assistant engineer.....	1,680 per year	510 32		510 32
Chas. Osborne.....	Junior assistant engineer.....	1,680 per year	617 81		617 81
L. C. Purdy.....	Junior assistant engineer.....	1,680 per year	176 18		176 13
H. L. Ramage.....	Junior assistant engineer.....	1,200 per year	274 62		274 62

Blue Line Surveys—(Continued)

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
H. S. Roberts	Junior assistant engineer	\$1,320 per year	\$706 77		\$706 77
W. C. Strecker	Junior assistant engineer	1,200 per year	135 48		135 48
L. E. Turpit	Junior assistant engineer	1,320 per year	110 00		110 00
J. A. Waddell	Junior assistant engineer	1,560 per year	150 97		150 97
F. S. Belotti	Engineering assistant	1,080 per year	11 61		11 61
H. A. Dayton	Engineering assistant	840 per year	238 23	\$2 56	240 79
R. B. Deutsch	Engineering assistant	840 per year	88 13		88 13
Louis Engel	Engineering assistant	840 per year	49 68		49 68
E. E. Fobes	Engineering assistant	840 per year	29 50		29 50
D. A. Gillette	Engineering assistant	840 per year	23 03		23 03
W. R. Glock	Engineering assistant	840 per year	281 13		281 13
H. H. Glosser	Engineering assistant	840 per year	276 39		276 39
A. H. Goodwin	Engineering assistant	840 per year	13 55		13 55
Edw. L. Horton	Engineering assistant	840 per year	6 77		6 77
S. Hurst	Engineering assistant	840 per year	11 29		11 29
H. E. MacEwen	Engineering assistant	840 per year	467 41		467 41
E. H. Mitchell	Engineering assistant	840 per year	349 99		349 99
W. E. Mullen	Engineering assistant	840 per year	287 90		287 90
J. C. Nolan	Engineering assistant	840 per year	300 32		300 32
G. W. Nostrand	Engineering assistant	840 per year	133 00		133 00
A. C. Pearce	Engineering assistant	840 per year	82 04		82 04
J. L. Quinlan	Engineering assistant	840 per year	23 33		23 33
J. J. Raup	Engineering assistant	1,020 per year	427 75		427 75
T. K. Smith	Engineering assistant	840 per year	77 30		77 30
Edw. A. Terrell	Engineering assistant	840 per year	2 26		2 26
H. E. Thompson	Engineering assistant	840 per year	56 45		56 45
L. R. Wells	Engineering assistant	840 per year	119 07		119 07
Frank Yates	Engineering assistant	960 per year	625 00		625 00
A. A. Snell	Boatman	3 00 per day	93 00		93 00
Peter Barton	Laborer	2 50 per day	282 50		282 50
Carl Bremer	Laborer	2 50 per day	147 56		147 50
H. L. Crouse	Laborer	2 50 per day	155 00		155 00
Wm. DeForest	Laborer	2 50 per day	10 00		10 00
R. J. Evers	Laborer	2 50 per day	190 00		190 00
J. P. Hooley	Laborer	2 50 per day	25 00		25 00
R. H. Kay	Laborer	2 50 per day	32 56		32 50
W. B. Lounsbery	Laborer	2 50 per day	95 00		95 00
M. Mets	Laborer	2 50 per day	42 50		42 50
F. J. Norton	Laborer	2 50 per day	187 50		187 50
G. W. Olmstead	Laborer	2 50 per day	22 50		22 50
H. F. Sponable	Laborer	2 50 per day	137 50		137 50
F. A. Turney	Laborer	2 50 per day	225 00		225 00
A. W. Wright	Laborer	2 50 per day	267 50		267 50
			\$25,311 58	\$791 33	\$26,102 91
<i>Incidental Expenses</i>					
Livery				\$578 25	
Fuel and light				69 73	
Postage				310 48	
Office rent				130 00	
Telegraph and telephone				67 35	
Miscellaneous				1,017 06	
					2,172 87
Total					\$28,275 78

Location of Bridge between Crescent and Rexford

Chapter 742, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
H. E. Brainard	Assistant engineer	\$2,590 per year	\$215 00		\$215 00
H. W. Benedict	Assistant engineer	2,340 per year	184 00		184 00
Total			\$399 00		399 00

Schenectady-Scotia Bridge

Chapter 735, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
R. H. Davis.....	Consulting engineer.....	\$750 per month	\$3,750 00	\$363 49	\$4,113 49
C. H. Wood.....	Senior assistant engineer.....	2,820 per year	1,311 46		1,311 46
A. G. Hayden.....	Assistant engineer.....	2,580 per year	599 91		599 91
J. M. Prior.....	Assistant engineer.....	1,980 per year	383 23		383 23
C. E. Quimby.....	Assistant engineer.....	1,980 per year	463 07		463 07
H. S. Sparr.....	Assistant engineer.....	2,160 per year	627 10		627 10
L. C. West.....	Assistant engineer.....	2,208 per year	641 03		641 03
J. M. Angus.....	Junior assistant engineer.....	1,800 per year	198 39		198 39
J. F. Blaise.....	Junior assistant engineer.....	1,800 per year	297 58		297 58
L. Greenalch.....	Junior assistant engineer.....	1,800 per year	972 58		972 58
J. S. Heath.....	Junior assistant engineer.....	1,200 per year	248 39		248 39
W. J. Henry, Jr.....	Junior assistant engineer.....	1,200 per year	160 22		160 22
J. S. Hyman.....	Junior assistant engineer.....	1,800 per year	479 03		479 03
Thos. McDonald.....	Junior assistant engineer.....	1,560 per year	205 48		205 48
Chas. Messina.....	Junior assistant engineer.....	1,560 per year	792 58		792 58
Total.....			\$11,130 05	\$363 49	\$11,493 54

State Boundary Line

Chapter 181, Laws of 1917; chapter 151, Laws of 1918

NAME	Rank	Rate of compensation	Services	Travel	Total
H. F. Eagan.....	Junior assistant engineer.....	\$1,440 per year	\$360 00	\$645 33	\$1,005 33
Theron C. Hoyt.....	Laborer.....	2 50 per day	40 00		40 00
<i>Incidental Expenses</i>			\$400 00	\$645 33	\$1,045 33
Livery.....				\$163 00	
Miscellaneous.....				108 10	
					271 16
Total.....					\$1,316 49

Delaware-Schoharie County Boundary Line

Chapter 559, Laws of 1918

NAME	Rank	Rate of compensation	Services	Travel	Total
R. S. Greenman.....	Senior assistant engineer.....	\$3,300 per year		\$25 90	\$25 90
H. C. Kline.....	Assistant engineer.....	2,580 per year	\$150 50	183 70	334 23
H. A. Dayton.....	Engineering assistant.....	840 per year	49 00		49 00
P. H. McMaster.....	Engineering assistant (provisional).....	840 per year	53 67		53 67
H. H. Slocum.....	Engineering assistant (provisional).....	840 per year	49 00		49 00
<i>Incidental Expenses</i>			\$302 17	\$209 60	\$511 79
Livery.....				\$102 00	
Postage.....				10 40	
Miscellaneous.....					112 66
Total.....					\$624 45

Saratoga-Warren County Boundary Line

Chapter 561, Laws of 1918

NAME	Rank	Rate of compensation	Services	Travel	Total
R. S. Greenman.....	Senior assistant engineer.....	\$3,300 per year.....		\$27 90	\$27 90
F. W. Harris.....	Assistant engineer.....	2,580 per year.....	\$179 17	139 00	318 17
Dwight Douglass.....	Engineering assistant (provisional)	840 per year.....	16 33		16 33
J. L. Lochner, Jr.....	Engineering assistant (provisional)	840 per year.....	32 67		32 67
C. W. Wood.....	Engineering assistant (provisional)	840 per year.....	32 67		32 67
M. W. Sarr.....	Engineering assistant (provisional)	840 per year.....	32 67		32 67
<i>Incidental Expenses</i>			\$293 51	\$166 90	\$460 41
Livery.....				\$35 50	
Postage.....				46	
Miscellaneous.....				26 81	
Total.....					\$523 20

Hydrographic Survey

Chapter 181, Laws of 1917

In coöperation with the United Geological Survey

Cora Ames.....	\$45 00
E. D. Burchard.....	174 92
Cameron & Hawn.....	48 00
Max Carson.....	252 00
W. E. Coe.....	45 00
C. C. Covert.....	720 62
Viola Davis.....	24 00
C. S. DeGolyer.....	33 50
Bessie Flanigan.....	12 00
O. W. Hartwell.....	58 55
Erastus Ingraham.....	60 00
W. A. James.....	11 81
Helen Kimmey.....	70 00
Leopold Voelpel & Co.....	15 00
James Lyons.....	27 00
George Marvin.....	15 00
J. Wendell Moulton.....	52 50
New York Telephone Company.....	61 45
D. L. Orcutt.....	36 00
Ralph Rose.....	30 00
Mrs. Volney Russell.....	24 00
William Seeley.....	48 00
N. A. Stevens.....	3 39
Total.....	\$1,867 74

SUMMARY

The foregoing tables are summarized as follows:

Ordinary Repairs to Canals

1. Erie canal, chapter 725, Laws of 1915.....	\$1,812 00
2. Erie canal, chapter 181, Laws of 1917.....	6,594 88
3. Champlain canal, chapter 181, Laws of 1917.....	3,405 12

Construction of Barge Canal

4. Head office account, chapter 147, Laws of 1903, and amendatory laws.....	193,755 10
5. Erie canal, chapter 147, Laws of 1903, and amendatory laws.....	87,888 12
6. Champlain canal, chapter 147, Laws of 1903, and amendatory laws.....	43,754 87

Construction of Barge Canal Terminals

7. Barge canal terminals, chapter 746, Laws of 1911, and amendatory laws.....	128,037 62
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Bridge Designers, Engineers, Etc.

8. Bridge designers, engineers, etc., chapter 181, Laws of 1917.....	1,969 58
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Special Work

9. High street bridge, Cohoes, chapter 181, Laws of 1917.....	158 84
10. Sea-wall, Orient Point, L. I., chapter 428, Laws of 1918.....	22 78

Special Surveys

11. Blue line surveys, chapter 181, Laws of 1917.....	28,275 78
12. Location of bridge between Crescent and Rexford, chapter 742, Laws of 1917.....	399 00
13. Schenectady-Scotia bridge, chapter 735, Laws of 1917.....	11,493 54
14. State boundary line, chapter 181, Laws of 1917; chapter 151, Laws of 1918.....	1,316 49
15. Delaware-Schoharie county boundary line, chapter 559, Laws of 1918.....	624 45
16. Saratoga-Warren county boundary line, chapter 561, Laws of 1918.....	523 20
17. Hydrographic survey, chapter 181, Laws of 1917.....	1,867 74

Total.....	<u>\$511,879 11</u>
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REPORT

OF THE

DIVISION ENGINEER

OF THE

MIDDLE DIVISION

For the Fiscal Year Ended June 30, 1918

MIDDLE DIVISION

STATE OF NEW YORK

DEPARTMENT OF STATE ENGINEER AND SURVEYOR .

MIDDLE DIVISION

SYRACUSE, N. Y., July 1, 1918.

HON. FRANK M. WILLIAMS, *State Engineer and Surveyor,*
Albany, N. Y.:

Sir.—I have the honor of submitting herewith my annual report as Division Engineer of the Middle Division of the New York State canals for the fiscal year ended June 30, 1918.

The engineering force on the Division the past year has been mainly engaged in supervising the work of completing and cleaning up the Barge canal contracts, in order to bring about the opening of the canal for public use on May 15 last. With the coöperation of the contractors, this was successfully done, so that on the regular date of opening the canal channel on this Division was sufficient in width and depth to accommodate traffic.

During the construction of the Barge canal on this Division a great many parcels of land lying adjacent to the new prism were needed for spoil-areas and were appropriated by the State for this purpose. After the completion of the canal prism many of these parcels were no longer needed for canal purposes and the original owners have sought to have the lands returned to them. Where satisfactory settlements have been made between these owners and the Superintendent of Public Works, the lands have been reconveyed, in many cases the State reserving the right to flood or overflow.

Numerous claims have arisen, due to the construction of dams built to maintain the flood levels at navigable stages. These claims are mainly for the alleged flooding of lands lying along the rivers. The engineers have been called upon to make surveys of these lands. Where surveys indicate that damages have

occurred, maps have been prepared for permanent appropriation or perpetual right to flood. These surveys and maps are being made by construction corps during such time as supervision of construction will permit.

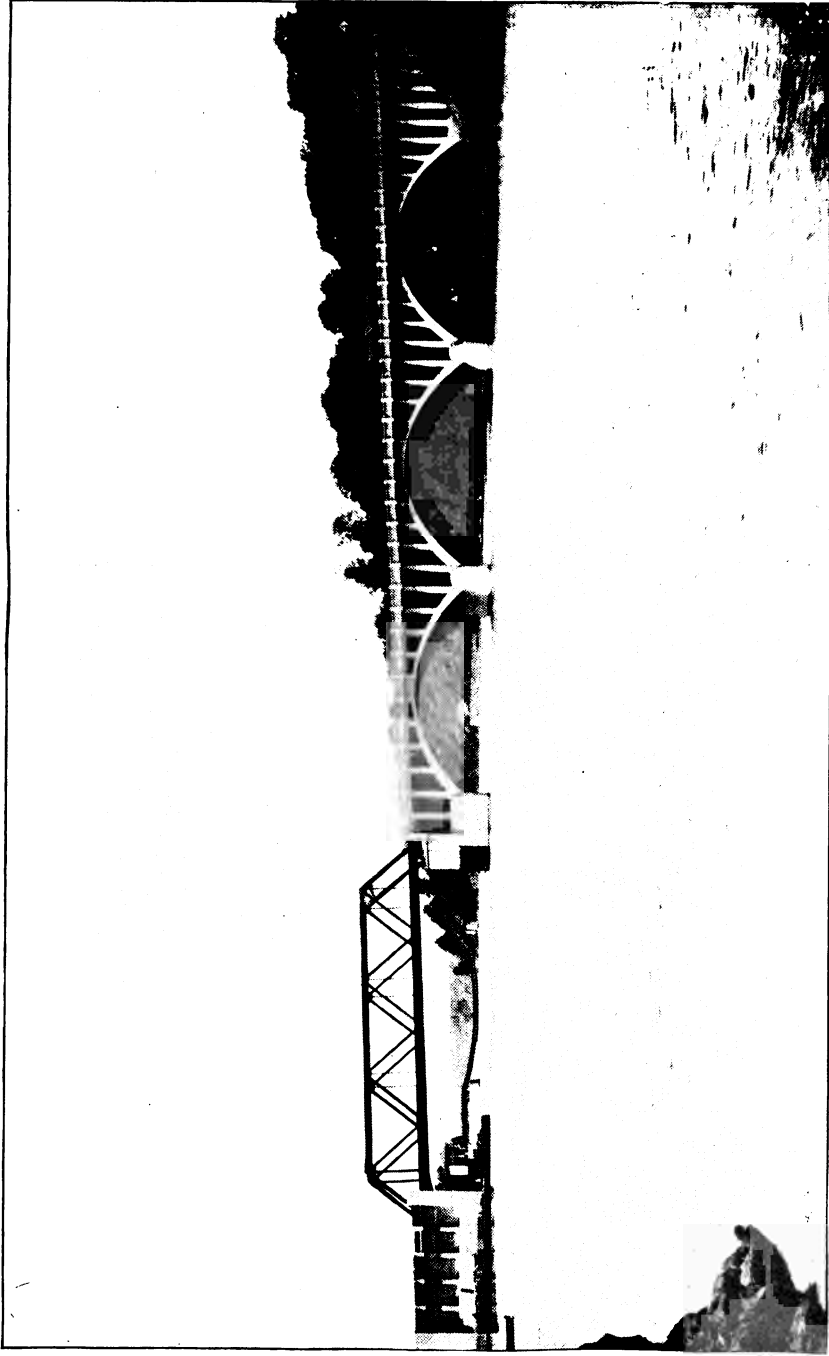
In addition to Barge canal work, the engineering force has taken care of the work authorized by special legislation; has made surveys and maps and prepared evidence for the Court of Claims; has spent much time in attendance at court; has prepared the necessary maps and data for the appropriation and release of lands; and has coöperated with the Department of Public Works in the location of buoys in the canalized lakes and rivers and the general care of the canals. A small force has also been kept on the work of locating and monumenting the blue line on those portions of the old Erie canal that it is proposed to abandon. The detailed report following will show what has been accomplished.

The dams and other structures on the Barge canal and feeders are mainly in good condition. Some repairs, however, are necessary. To prevent leakage and damage to the structures, the abutments to the curved dam at Oswego and to the dam across Owasco outlet at Auburn should be repaired.

The water-supply on this Division for the Barge canal, *i. e.*, the new channel, has been ample, but, although the rainfall during the season has been more than the average, the reservoirs to the south of the old canal have been severely taxed to maintain the levels of the old canal between Syracuse and Utica. While the level between Syracuse and New London has been maintained, it has been impossible to keep up that from Rome to Utica.

The dam across Chittenango creek at the head of the feeder is in bad condition. It is an old wooden structure with masonry abutments and bulkhead walls. It leaks badly not only through but underneath the spillway. It is liable to go out at any time. It should be replaced at the earliest possible date with a new concrete structure. Cowaselon dam was washed out several years ago. It should be rebuilt in concrete, in order to divert the water from the creek to the canal feeder.

Chapter 346, Laws of 1918, provides for the construction of a dive culvert at Rome for the purpose of maintaining the proper



BRIDGE ACROSS THE BARGE CANAL AND OSWEGO RIVER AT MINETTO

View showing the three concrete arch spans built by the towns, the steel span, which crosses the canal channel and is convertible to a bascule, and the counterweight pit. Minetto lock appears in the distance.

water-level of the old canal between Rome and Utica. The necessary surveys have been made for the work and plans are being prepared at the Albany office. Before the work can be started, it will be necessary to make some repairs to the west guard-gate at Rome. In an attempt to draw that portion of the Rome level of the Barge canal between the guard-gate and lock No. 21, a leak developed underneath the southwest wing wall of the substructure of the guard-gate and it was of such magnitude that the immediate restoration of the level was necessary. It will be unsafe to close the gate and lower the level to the west of it, to any extent, without first making sure that the leak has been stopped.

On filling the old canal last spring, a break occurred under the northeast wing of Durhamville aqueduct over Oneida creek. The leak was detected before serious damage was done and repaired in time for the opening of navigation.

The reports of the Senior Assistant Engineers, which are appended, give in detail the condition and progress of the work on the Division.

Permit me to thank you and your representatives for your courtesy and assistance in carrying on the work of the Division and to commend the men under me for their support and their faithful and efficient service.

Respectfully submitted,

GUY MOULTON,

Division Engineer.

APPENDED REPORTS—MIDDLE DIVISION

SPECIAL APPROPRIATIONS

Continuing and Completing the Construction of a Bridge over the Black and Moose Rivers at Lyons Falls, Lewis County

(Chapters 699 and 728, Laws of 1915)

Contractor, Walter S. Rae.

Engineer in charge, David R. Lee.

Engineer's estimate	\$59,385.00
Contractor's bid	54,911.00
Amount of final account.....	56,722.28

A supplementary agreement, approved by the Canal Board May 23, 1917, increased the cost by \$6,630.60.

A supplementary agreement approved by the Canal Board September 18, 1917, further increased the cost by \$177.80, making the contract price as modified by these agreements \$61,719.40.

Improvement of Cowaselon Creek, in the County of Madison, by Dredging and Otherwise

(Chapter 781, Laws of 1917)

Contractor, Robert Provo.

Engineer in charge, David R. Lee.

Engineer's estimate	\$12,000.00
Contractor's bid	10,500.00
Work done to date.....	1,030.00

Improvement of Limestone Creek in the Village of Fayetteville

(Chapter 751, Laws of 1917; chapter 339, Laws of 1918)

Surveys, studies and plans have been made for deepening, widening, straightening and otherwise improving Limestone creek in the village of Fayetteville, as provided by chapter 339,

Laws of 1918, which amended chapter 751, Laws of 1917, and made a reappropriation for the work. On account of the increased cost of labor and materials, due to war conditions, the estimated cost was found to be larger than the appropriation and therefore the work has not been advertised.

Bridge over the Cayuga and Seneca Canal at Lake Street, Geneva

(Chapter 351, Laws of 1918)

The survey for this bridge has been made and the location map was plotted and sent to Albany.

Restoring the Black River Canal

(Chapter 564, Laws of 1918)

The restoring of the Black River canal to a navigable condition will probably be done by the Department of Public Works, as permitted by the Act and in accordance with the decision of that department.

The following surveys have been made and maps and reports prepared to accompany them:

For the construction of a concrete dockwall at Canandaigua lake harbor.

For the construction of approaches, for foot and vehicular traffic on the southerly side of the Erie canal, to the bridge over that canal in the village of Yorkville.

For the improvement of Glen, or Mill, creek in the county of Schuyler.

LAND ABANDONMENTS AND SURVEYS

(Chapter 299, Laws of 1916)

A survey has been made and maps prepared for the abandonment of the old Erie canal and all State lands adjacent thereto, between the east and west city lines of the city of Syracuse, all according to rules and regulations laid down by the Commissioners of the Land Office.

COURT OF CLAIMS

In addition to the work usually required by the Superintendent of Public Works in connection with ordinary repairs, a large amount of survey work and mapping has been made of property alleged to have been damaged by the State, reports made and data properly arranged for the Court of Claims and the Attorney-General. A large amount of time is spent by the engineers as witnesses for the State on local claims during the sessions of the Court.

BLUE LINE SURVEY

(Chapter 646, Laws of 1916; chapter 151, Laws of 1918)

These laws provide for surveys, field notes and manuscript maps affecting various canals and canal lands.

Three field parties were at work establishing and monumenting the State's right of way along the Erie and Oswego canals on the Middle Division. Field work started in August, 1917, and was stopped on November 8, 1917.

The following work has been done during the fiscal year ended June 30, 1918:

Erie Canal

Tracings on standard size sheets were completed from the east city line of Syracuse to the village of Warners.

The blue line and the red line were run out and monumented from Centerport road bridge to the Wayne county line, including all land appropriations made during the Nine-Million Improvement.

All blue line points are monumented with iron rods $\frac{3}{4}$ inch in diameter and 3 feet long. Reinforced concrete monuments 8 inches in diameter and $4\frac{1}{2}$ feet long, with metal tablet imbedded in the top, showing station, offset distance and angle point, have been set to establish the red line.

Oswego Canal

The blue line and the red line were run out and monumented from the junction of the Erie and Oswego canals northward to the north city line of Syracuse and tracings on standard size sheets were completed.

The blue line and the red line were also run out and monumented on the north and south side-cuts and tracings on standard size sheets were completed.

ERIE CANAL, RESIDENCY No. 5

Senior Assistant Engineer Edward J. Berry reports:

This residency extends from the east end of Oneida county to Oneida lake, a distance of 31.06 miles, and includes the former water-supply residency.

During the year, in addition to Barge canal construction, our engineers have worked in conjunction with forces of the Superintendent of Public Works' department, taking sections, setting buoys, etc., on maintenance work made necessary by the sand brought into the canal channel by Wood and Fish creeks.

Reports are given on contracts Nos. 42-A, 43, 44-A, 51, 81, 156 and 157, terminal contracts Nos. 15-D, 15-M, 16-P, 63 and 205, and those parts of Nos. 101 and 106 within this residency, also on Rome highways.

Contract No. 42-A

This contract is for completing the construction of the canal, together with all incidental work, between the Herkimer-Oneida county line and a point just east of Oriskany road, Sta. 5775. Length, 8.96 miles. It was awarded to Grant Smith & Company & Locher, being signed on February 24, 1913. Construction work began March 13, 1913. The engineer's preliminary estimate was \$1,033,037.85, the contractor's bid, \$1,014,671.83. The contract price as modified by alterations Nos. 1 and 2 is \$1,239,045.03. Excess steel castings to the value of \$220.00 have been authorized by the Canal Board. The value of work done during the year is \$54,370, total done to date, \$1,194,050. The amount paid on extra work orders during the year is \$332.69, total to date, the same.

Robert E. Swinney, Assistant Engineer, is in charge.

An extra work order dated January 11, 1918, provides for repairs to pavement on Genesee street bridge. The final account, amounting to \$332.69, was approved by the Canal Board January 23, 1918.

On June 30, 1917, 92 per cent of this contract was completed. During the past fiscal year the work of flattening the side slopes of the prism, placing riprap and cleaning up the site has been finished.

The contract was completed June 21, 1918. The final account is now being prepared.

Contract No. 43

This contract is for constructing the canal from a point just east of Oriskany road to about 1,500 feet west of Mud creek. Length, 10.32 miles. It was awarded to the M. A. Talbott Co., being signed on October 15, 1909. Construction work began about September 1, 1910. The engineer's preliminary estimate was \$1,529,885.00, the contractor's bid, \$1,320,560.00. The contract price as modified by alterations Nos. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16 is \$1,388,080.05. The work was accepted October 16, 1917, and the final account, amounting to \$1,281,571.54, was approved by the Canal Board July 17, 1918. The amount paid on extra work orders during the year is \$9,661, total to date, \$24,977.

Lewis Bartlett, Assistant Engineer, is in charge.

An extra work order dated October 25, 1916, provided for repairs to the concrete paving below Nine-Mile creek spillway, which had become displaced in several places, and for placing additional riprap along the banks below the spillway where erosion had taken place. The final account, amounting to \$8,474.66, was approved by the Canal Board March 20, 1918.

An extra work order dated July 23, 1917, provided for building a wooden bridge across the ditch opposite Sta. 5791 to furnish access to certain farm lands which would be otherwise isolated. The final account, amounting to \$157.87, was approved by the Canal Board February 13, 1918.

An extra work order dated September 19, 1917, provided for the placing of stone protection at the culvert near Sta. 5895. The final account, amounting to \$265.56, was approved by the Canal Board January 23, 1918.

An extra work order dated September 21, 1917, provided for the placing of stone protection on the west dike at Nine-Mile

creek entrance and also at three other stream entrances in order to protect the banks, and also for removing a large amount of debris which had come down the river during the spring freshet and lodged at the Nine-Mile creek spillway. The final account, amounting to \$762.85, was approved by the Canal Board January 9, 1918.

The contract work was finished in September, 1917.

When the repairs at the Nine-Mile creek spillway were undertaken it was found that more work was necessary than had been expected, as the supporting earth had been entirely washed away below the slabs of concrete adjacent to the spillway. These slabs were removed and the space below filled with material carefully puddled. Before relaying the slabs, a shelf was cut in the side of the spillway. Holes were drilled in the spillway and in these steel rods were inserted. These rods ran also into the concrete slabs, thus tying them to the spillway. The concrete removed was used as additional bank protection.

The work at the culvert near Sta. 5895 became necessary when the embankment immediately over the culvert washed away. In order to prevent further erosion this stone protection was placed.

Contract No. 81

This contract is for constructing a junction lock at Rome. It was awarded to Chesley, Earl & Heimbach, Inc., being signed on October 17, 1916. Construction work began November 4, 1916. The engineer's preliminary estimate was \$61,236.40, the contractor's bid, \$53,998.90. The contract price as modified by alteration No. 1 is \$54,685.90. The value of work done during the year is \$3,527. The work was accepted January 16, 1918, and the final account, amounting to \$49,206.89, was approved by the Canal Board January 23, 1918. The amount paid on extra work orders during the year is \$247.21, total to date, \$1,387.21.

Lewis Bartlett, Assistant Engineer, was in charge.

An extra work order dated February 23, 1917, provides for furnishing labor and materials necessary to construct patterns

for hand-wheels, main supports, bearings and cup wheels, also for shipping them to the Division Superintendent of Public Works. Patterns for these parts were to have been loaned to the contractor by the Superintendent of Public Works but were not available when needed. The final account, amounting to \$68.71, was approved by the Canal Board September 5, 1917.

An extra work order dated March 22, 1917, provides for transporting steel sheet-piling from the site of contract No. 44 to the junction lock at Rome, driving it for sheeting, and returning it when no longer required. The final account, amounting to \$1,263.50, was approved by the Canal Board December 19, 1917.

On July 1, 1917, the contractor started building the lock-gates and by July 15, 1917, these gates were finished and placed in position, the tumble-gate machinery installed, embankment made and the lock made ready for operation when water was let into the Erie canal by the Department of Public Works on July 15, 1917.

From July 15 to August 25, 1917, a small force was at work pulling steel sheet-piling, grading, placing wash wall, etc.

The contract was finished during the fiscal year ended June 30, 1918.

Contract No. 157

This contract is for constructing a dam across the old Erie canal at Rome. It was awarded to Thomas Bowen, being signed on April 20, 1917. Construction work began April 24, 1917. The engineer's preliminary estimate was \$4,924.00, the contractor's bid, \$5,912.00. The contract price as modified by alteration No. 1 is \$6,247.50. Excess forming embankment to the value of \$44.00 has been authorized by the Canal Board. The value of work done during the year is \$5,390. The work was accepted October 31, 1917, and the final account, amounting to \$5,890.22, was approved by the Canal Board February 5, 1918.

D. J. Levinson, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board April 25, 1917, changes the location of the dam and increases the length of the tow-path wall. It increases the contract price by \$335.50.

This dam is built across the old Erie canal to act as a spillway and to maintain the level above the north junction lock. The contract was completed during the fiscal year.

Contract No. 44-A

This contract is for completing the construction of the canal prism near the junction lock at New London. It was awarded to Scott Brothers, being signed on October 10, 1916. Construction work began about November 1, 1916. The engineer's preliminary estimate was \$57,050.00, the contractor's bid, \$52,486.00. The value of work done during the year is \$9,830, total done to date, \$45,970.

Foster B. Crocker, Assistant Engineer, is in charge.

The State dipper-dredge *Pathfinder* was rented to complete the removal of some hard material that the hydraulic dredge had been unable to remove. This machine completed removing the material from the canal prism, but had not cleaned up the entrance to the junction lock when it was taken back by the Department of Public Works. As the drag-line machine could not excavate this material, the work has not yet been completed. The drag-line machine worked trimming slopes until December 15, 1917, after which it was dismantled and shipped away.

Contract No. 156

This contract is for constructing a highway bridge across Wood creek about one mile east of Sylvan Beach. It was awarded to Chesley, Earl & Heimbach, Inc., being signed on August 28, 1917. Construction work began October 17, 1917. The engineer's preliminary estimate was \$7,788.00, the contractor's bid, \$9,813.00. The contract price as modified by alteration No. 1 is \$10,113.00. The value of work done to date is \$2,510.

Foster B. Crocker, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board February 13, 1918, substitutes round piles for wooden sheet-piling in foundation of bridge. It increases the contract price by \$300.00.

The contractor began work excavating and driving piles on October 17, 1917, and continued work until weather conditions became so severe that he was forced to shut down. High water prevented his resuming work again until June 14, 1918. The foundation piles are all driven, footings for both abutments are ready to pour, bridge steel is delivered and concrete plant is being assembled.

Contract No. 51

This contract is for constructing a canal feeder between Trenton Falls and Nine-Mile creek, together with a gate-house, culverts and all other work appertaining to the contract. Length, 5.75 miles. It was awarded to George T. Cunningham, being signed on December 23, 1910. It was assigned to the Alto Construction Company and this assignment was approved by the Superintendent of Public Works August 8, 1911. Construction work began February 27, 1911. The engineer's preliminary estimate was \$424,710.00, the contractor's bid, \$389,842.50. The contract price as modified by alterations Nos. 1, 2, 3, 4, 5, 6 and 7 is \$414,869.85. The value of work done during the year is \$6,827, total done to date, \$360,607. The work was accepted October 16, 1917, and the final account, amounting to \$360,607.46, was approved by the Canal Board December 4, 1917. The amount paid on extra work orders during the year is \$2,457, total to date, \$14,474.

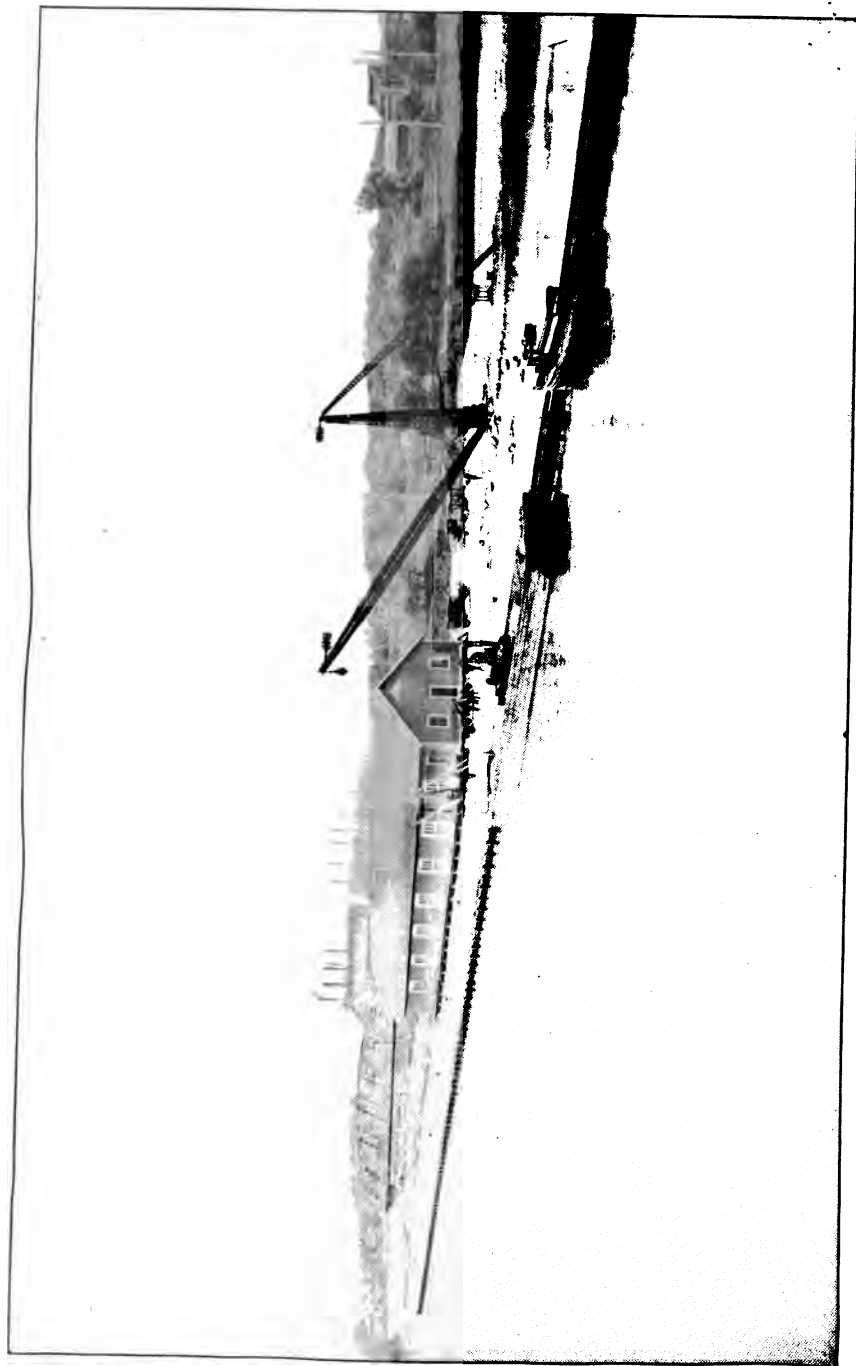
John L. Bush and Geo. H. Briggs, Assistant Engineers, have been in charge.

An extra work order dated July 26, 1917, provides for paving numerous ditch and stream entrances with stone laid in mortar, for repairing certain cobblestone gutters at highway crossings and for constructing vitrified pipe culverts. The final account, amounting to \$2,457.03, was approved by the Canal Board August 21, 1917.

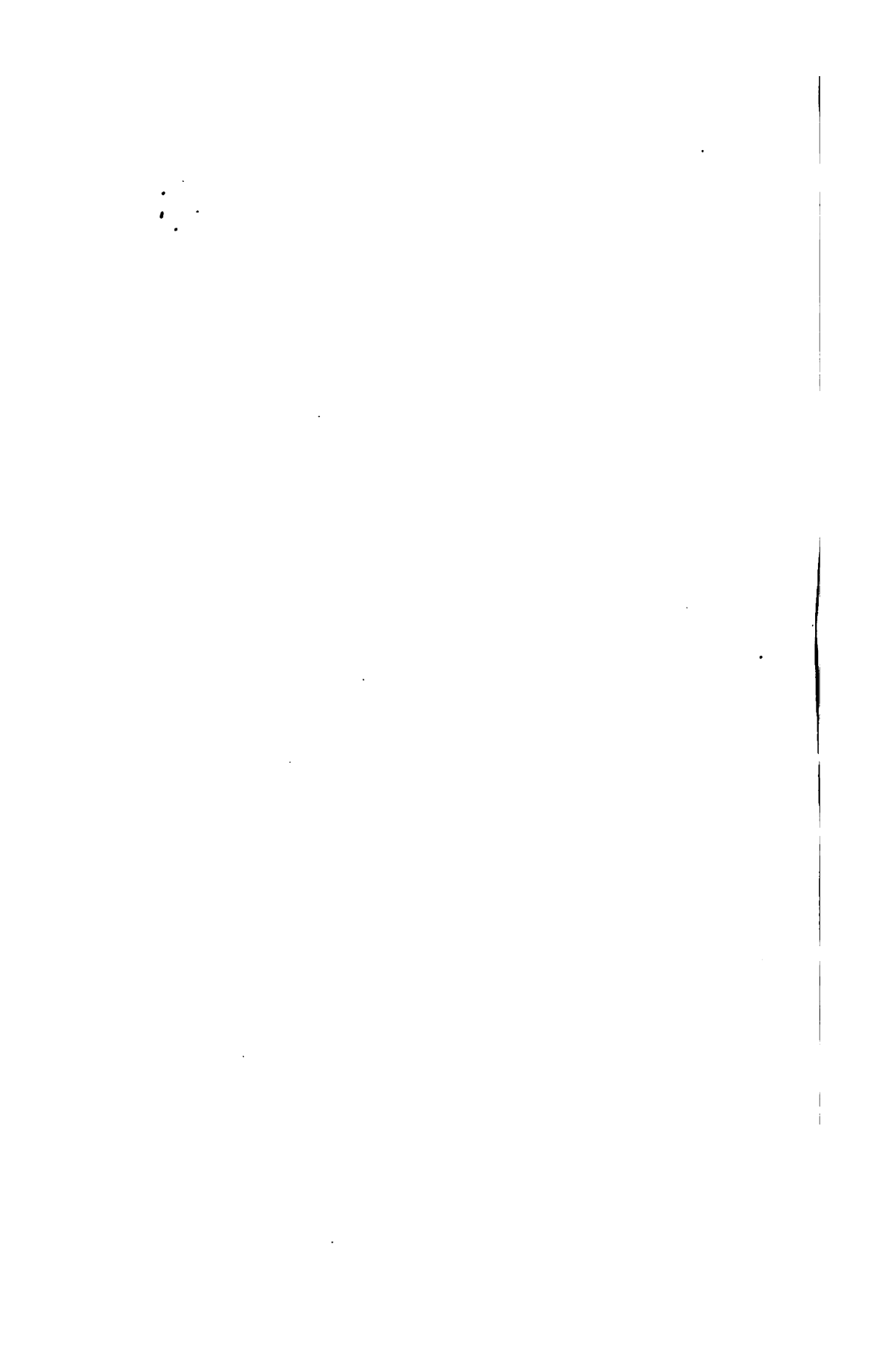
The placing of third-class riprap on the banks of the feeder, as provided by alteration No. 7, was finished by July 27, 1917. Some material that slid into the feeder prism was reëxcavated and the banks were widened in places where seepage appeared. Some miscellaneous work and the cleaning up of the site of the contract brought the work to completion by October 5, 1917.

Terminal Contract No. 205

This contract is for constructing temporary terminal warehouses at Utica and Rome. It was awarded to William R. Kimmey, being signed on March 14, 1917. Construction work began April 21, 1917. The engineer's preliminary estimate was \$2,320.00, the contractor's bid, \$2,100.00. The contract price



BARGE CANAL TERMINAL AT ROME
At six of the canal terminals 12-ton steel derricks were installed. The view shows one of these derricks unloading a steam portable engine.



as modified by alteration No. 1 is \$13,906.75. The value of work done during the year is \$691. The work was accepted October 23, 1917, and the final account, amounting to \$13,520.55, was approved by the Canal Board January 23, 1918. The amount paid on extra work orders during the year is \$144.88, total to date, the same.

Robert E. Swinney and Lewis Bartlett, Assistant Engineers, were in charge.

An extra work order dated May 8, 1917, provides for grading a roadway in the rear of the terminal warehouse at Utica. The final account, amounting to \$64.16, was approved by the Canal Board July 11, 1917.

An extra work order dated July 9, 1917, provides for placing galvanized wire screens on the doors and windows of the warehouses to prevent burglary. The final account, amounting to \$80.72 (\$40.91 at Rome and \$39.81 at Utica), was approved by the Canal Board October 23, 1917.

This contract was 95 per cent completed on June 30, 1917. During July and August, 1917, these warehouses were painted and wired, and also the placing of wire screens on the doors and windows was completed. The contract was finished in August, 1917.

Terminal Contract No. 15-D

This contract is for constructing a drainage system at Utica. It was awarded to Mohawk Dredge and Dock Company, Inc., being signed on August 13, 1917. Construction work began August 31, 1917. The engineer's preliminary estimate was \$8,200.00, the contractor's bid, \$8,989.00. The work was accepted December 4, 1917, and the final account, amounting to \$8,863.39, was approved by the Canal Board January 9, 1918. The amount paid on extra work orders is \$412.70.

An extra work order dated September 24, 1917, provides for the installation of an electric transmission line from the Utica Gas & Electric Co.'s line to the Utica warehouse. The final account, amounting to \$350.00, was approved by the Canal Board October 23, 1917.

An extra work order dated September 29, 1917, provides for the substitution of 190 lin. ft. of 8-in. drain pipe in place of 4-in. pipe called for by the plans. The final account, amounting to \$62.70, was approved by the Canal Board October 23, 1917.

The contract work was finished on November 20, 1917.

Terminal Contract No. 15-M

This contract is for electrical equipment and machinery for operating and lighting the Utica terminal. It was awarded to Lupfer and Remick, being signed on October 31, 1917. Construction work began April 26, 1918. The engineer's preliminary estimate was \$30,681.20, the contractor's bid, \$36,967.50. The value of work done to date is \$7,140.

Concrete platforms for cabinets have been built, one valve and one gate machine delivered and partly set up and all motors, lamps, conduits and cables have been delivered.

On June 30, 1918, this contract is 19 per cent completed.

Terminal Contract No. 63

This contract is for constructing railroad tracks and brick pavement on the Barge canal terminal at Utica. It was awarded to Harry W. Roberts & Co., being signed on April 19, 1918. The engineer's preliminary estimate was \$9,590.00, the contractor's bid, \$10,164.00.

Lewis Bartlett, Assistant Engineer, is in charge.

An extra work order dated May 8, 1918, provides for making certain alterations to the freight-shed, so as to provide a field office for the engineers at the site.

The only feasible method of making track connection between this terminal and the New York Central railroad is by means of a grade crossing in North Genesee street at its intersection with Wurz avenue. The city administration is very strongly opposed to such a grade crossing. This condition makes it advisable to postpone the construction of tracks.

The only work done up to July 1, 1918, has been the hauling of brick to the site of the contract.



NEW YORK CENTRAL RAILROAD BRIDGE (R., W. & O. BRANCH) OVER ONEIDA RIVER AT BREWERTON
This structure replaces a bridge which had fixed spans and a draw. Beyond the bridge may be seen the Brewerton lighthouse
— one of three Barge canal lighthouses for marking courses on Oneida Lake.

Terminal Contract No. 106

This contract is for furnishing fourteen two-ton steam tractor cranes for Barge canal terminals. The following report relates to the work at Utica. The contract was awarded to the John F. Byers Machine Co., being signed on February 14, 1918. The engineer's preliminary estimate was \$5,250.00 per crane, the contractor's bid, \$5,265.00 per crane. The contract price as modified by alteration No. 1 is \$5,515.00 per crane. The value of work done at Utica to date is \$5,210.

Alteration No. 1, approved by the Canal Board March 27, 1918, provides for housing the fourteen cranes on this contract. It increases the contract price by \$250.00 per crane.

The crane for the Utica terminal has been delivered.

Terminal Contract No. 16-P

This contract is for paving the terminal area at Rome. It was awarded to E. Brown Baker, being signed on June 4, 1917. Construction work began June 6, 1917. The engineer's preliminary estimate was \$3,300.00, the contractor's bid, \$3,909.50. Excess quantities to the value of \$430 have been authorized by the Canal Board. The value of work done during the year is \$4,170, total done to date, the same. On June 19, 1918, the Canal Board accepted the work and approved the final account, which amounted to \$4,169.50.

Lewis Bartlett, Assistant Engineer, was in charge.

The contract work was finished in May, 1918.

Terminal Contract No. 101

This contract is for furnishing and installing steel stiff-leg derricks on terminal sites at Albany, Whitehall, Little Falls, Rome, Lockport and Tonawanda. The following report relates to work at Rome. The contract was awarded to E. Brown Baker, being signed on December 18, 1916. On February 21, 1917, it was assigned to the Mohawk Dredge & Dock Co., Inc., and this assignment was approved by the Superintendent of Public Works March 26, 1917. The engineer's preliminary estimate for the derrick at Rome was \$3,885.50, the contractor's bid, \$5,684.00.

Excess metal (Rome) to the value of \$1,330.00 has been authorized by the Canal Board. The value of work done at Rome during the year is \$6,720, total done to date, the same.

Lewis Bartlett, Assistant Engineer, is in charge.

An extra work order dated December 11, 1917, provides for furnishing and installing motors and the necessary connecting gears at Rome and Little Falls.

The contract work and the work under the extra work order have been finished and the final estimate is being prepared.

Highways at Rome

This contract is for the construction of two connecting highways, Muck road to James street and Whitesboro street to Mill street, in the city of Rome. Length, one mile. It was awarded to Harry A. Schaupp of Guilderland, N. Y., being signed on January 17, 1916. Work was begun May 21, 1916. The engineer's preliminary estimate was \$28,634.55, the contractor's bid, \$32,111.15. The final account, amounting to \$31,730.24, was approved by the Canal Board March 6, 1918.

Henry J. O'Neill and D. J. Levinson, Assistant Engineers, have been in charge.

It was found that the earth at the site of the highway between James street and Muck road was very porous and spongy and in order to secure a firm base for the highway it was necessary to use a much larger quantity of gravel than had been expected.

The contract was completed during the fiscal year.

ERIE CANAL, RESIDENCIES NOS. 6 AND 7

Senior Assistant Engineer Edward J. Berry reports:

Residency No. 6 extends from deep water at the western end of Oneida lake to Baldwinsville, a distance of about 23.4 miles, and includes also the work under contract No. 132, which pertains to aids to navigation on Oneida lake. Residency No. 7 extends from Baldwinsville to the Wayne county line, a distance of about 32.7 miles. This report covers the work on the following con-



MOVABLE DAM OF BRIDGE TYPE IN THE CLYDE RIVER AT MAYS POINT

This structure is similar in type to the Mohawk river dams, but is smaller. Unlike the large dams it is operated by hand, the gates being counterweighted for this purpose.

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tract3: Contracts Nos. 46-A, 46-B, 132, 165 and 184, parts of Nos. 153, 172 and 173, and terminal contracts Nos. 20, 28, 29 and 213 and part of No. 106.

Contract No. 132

This contract is for constructing lighthouses, range towers, beacons, etc., and for furnishing and installing buoys and lighting equipments for aids to navigation on Oneida and Onondaga lakes. It was awarded to Lupfer & Remick, being signed on November 3, 1916. The engineer's preliminary estimate was \$63,937.00, the contractor's bid, \$70,330.20. The contract price as modified by alteration No. 1 is \$70,267.80. Excess quantities to the value of \$2,567.50 have been authorized by the Canal Board. The value of work done during the year is \$29,399. On April 10, 1918, the Canal Board accepted the work and approved the final account, which amounted to \$69,669.29.

W. J. Durkan, Assistant Engineer, was in charge.

Alteration No. 1, approved by the Canal Board December 4, 1917, eliminates pile-cluster lights at the Syracuse terminal entrance and round cable in connection therewith and the steel cabinet lighting equipment for the first range at Constantia. It decreases the contract price by \$62.40.

The work done during the year has consisted principally in pouring concrete for the upper portion of the tower on Frenchman's island and for the whole tower at Sylvan Beach except the foundation, the completion of these lighthouses, together with the one at Brewerton, the erection of the tower at Syracuse, the installation of electrical equipment on this tower and on the N. Y. Central bridge at Syracuse, the adjustment of lights and painting. The lights were all in operation August 31, 1917, except those on the Syracuse and Sylvan Beach towers. The contract was practically finished by November 16, 1917.

Contract No. 184

This contract is for excavating a channel under the N. Y. C. R. R. bridge at Brewerton. It was awarded to Mohawk Dredge and Dock Co., Inc., being signed on April 12, 1918. The engineer's preliminary estimate was \$7,200.00, the contractor's bid,

\$9,480.00. The value of work done during the year is \$9,400, total done to date, \$9,400.

H. H. Brown, Assistant Engineer, is in charge.

The excavation has been made with a dipper-dredge and a derrick-boat equipped with clam-shell and drag-line buckets. The derrick-boat was also equipped with drills. The plant began to arrive on April 26, and the contract work was finished on June 21, 1918. The final account has been prepared and forwarded to Albany.

Contract No. 153

The portion of this contract affecting this residency provides for furnishing and delivering oil-burning lanterns for buoy, stake and bridge lights on the Oneida and Seneca rivers. It was awarded to R. B. Wing & Son, being signed on February 28, 1917. The engineer's preliminary estimate was \$12.00 per lantern, the contractor's bid, \$12.54 per lantern. On October 3, 1917, the Canal Board accepted the contract and approved the final account, the amount being the same as the contractor's bid.

Ninety-three lanterns were delivered for use on residency No. 6 at a cost of \$1,166.22.

Contract No. 172

The portion of this contract affecting this residency provides for furnishing and delivering at Baldwinsville 47 red barrel buoys, 48 black barrel buoys, 10 red lamp-posts and 16 black lamp-posts, for aids to navigation on the Seneca river. The contract was awarded to Lupfer & Remick, being signed on March 15, 1918. The engineer's preliminary estimate for the whole contract was \$14,853.00, the contractor's bid, \$13,063.20. The contract price as modified by alteration No. 1 is \$12,921.45. The value of work done to date on this residency is \$4,720. The amount paid on extra work orders to date is \$906.50, of which amount \$465.50 applies to work on this residency.

N. R. McLoud, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board May 23, 1918, eliminates the requirements for galvanizing the hoops on the barrel buoys. It decreases the contract price by \$141.75.



LOCK NO. 25, AT MAYS POINT
A unique feature of this lock is the steel arch across the upper end. This arch carries the cables used in the electric operating installation.

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An extra work order dated April 4, 1918, provides for making concrete anchors for the buoys. The final account, amounting to \$906.50 (\$465.50 for this residency), was approved by the Canal Board June 27, 1918.

Owing to the necessity for marking the channel at the opening of navigation on May 15, 1918, these buoys were placed along the channel in an unfinished condition, 75 per cent of their contract price being allowed in the monthly estimates. The lamp-posts which were to have been delivered at Baldwinsville were shipped to Clyde.

Contract No. 173

The portion of this contract affecting this residency provides for furnishing and delivering at Baldwinsville 245 oil-burning lanterns for buoy, stake and bridge lights on the Seneca river. It was awarded to R. B. Wing & Son, being signed on February 9, 1918. The engineer's preliminary estimate was \$19.00 per lantern, or \$4,655.00 for this residency, the contractor's bid, \$17.92 per lantern, or \$4,390.40 for this residency. On June 26, 1918, the Canal Board accepted the work and approved the final account, the amount being the same as the contractor's bid.

These lanterns were duly delivered and accepted.

Contract No. 46-A

This contract is for completing the construction of the canal from Fox Ridge to Montezuma aqueduct. Length, 4.49 miles. It was awarded to James Stewart & Co., Inc., being signed on September 2, 1914. The engineer's preliminary estimate was \$333,941.50, the contractor's bid, \$196,133.50. The value of work done during the year is \$22,689, total done to date, \$180,439. The work was accepted September 5, 1917, and the final account, amounting to \$180,438.93, was approved by the Canal Board January 9, 1918. The total amount paid to date on extra work orders is \$899.38, all prior to the present year.

J. G. Palmer, Assistant Engineer, was in charge.

An extra work order dated July 26, 1917, provides for driving clusters of fender piles at three railroad bridges, the R. S. & E., the N. Y. Central and the West Shore, to protect boats from

coming in contact with certain steel sheet-piling, which had been used for coffer-dams and was left in place. This work was not done under this contract, but has been incorporated in contract No. 165.

Prism excavation just north of the Toll road bridge was in progress at the beginning of the year, a dipper-dredge and a hydraulic dredge being used. The dipper-dredge loosened the hard material and cast it over. This dredge was removed from the contract on July 23, 1917. The hydraulic dredge removed the loose material and deposited it in the spoil-bank. This dredge finished the excavation to Toll road bridge on July 28, and was then moved to a point north of the West Shore bridge, where on July 30 and 31 it excavated a bar which had formed at that point. It was then moved to a point north of Fox Ridge and began excavating at Sta. 5223 on August 2. In the evening of that day the levees broke and operations were suspended.

A diving outfit was used during July in removing boulders at the N. Y. Central bridge.

The placing of riprap at the West Shore railroad bridge was finished by July 13, and at the R. S. & E. trolley bridge by August 3.

The contract was completed and the plant entirely removed by August 3, 1917.

Contract No. 46-B

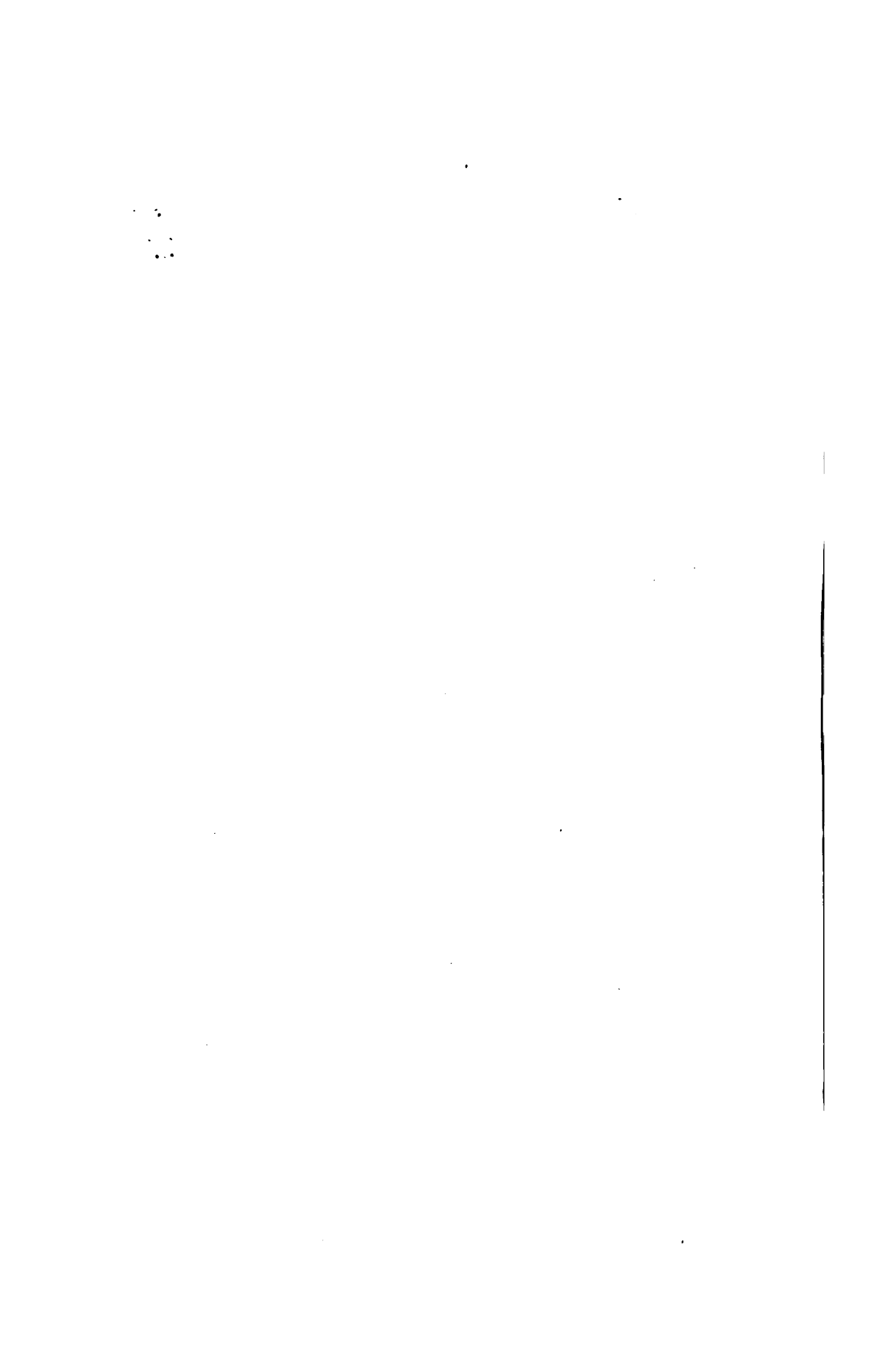
This contract is for the construction of a lock, dam, etc., at May's Point. Length, 0.66 mile. It was awarded to Scott Bros., being signed on February 25, 1916. The engineer's preliminary estimate was \$314,660.72, the contractor's bid, \$277,348.22. The contract price as modified by alterations Nos. 1 and 2 is \$293,676.97. Excess quantities to the value of \$3,330.00 have been authorized by the Canal Board. The value of work done during the year is \$114,570, total done to date, \$258,760.

J. G. Palmer, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board July 25, 1917, provides for completing the installation of electrical and mechanical equipment at lock No. 25, May's Point. It increases the contract price by \$13,343.65.



BARGE CANAL TERMINAL AT SYRACUSE
Syracuse harbor, at the head of a spur extending from the main canal through a stretch of Seneca river and Onondaga lake, consists of two piers, three slips and adjacent dockwalls. This view shows the south pier, slip and dockwall.



Alteration No. 2, approved by the Canal Board November 9, 1917, modifies plan for north approach of bridge over lock No. 25, and provides for furnishing and erecting a steel overhead structure for carrying cable across the upper end of lock. It increases the contract price by \$2,985.10.

The contract is for the completion of work embraced in old contract No. 46, and includes the masonry and steelwork of the lock and the walls to connect with the approach walls built under contract No. 46; also the superstructure of a movable dam in the Seneca river, a highway bridge with approaches over the lock, the cleaning of the prism, the removal of coffer-dams, etc.

On June 30, 1917, this contract was 52 per cent completed. During the past fiscal year the lock and its approaches, together with the highway and bridge, were completed, except the work of placing top soil on embankments and seeding them. The movable dam was completed, except the forming of a small amount of embankment at the south approach and the placing of chains and counterweights to be connected to the lower gates and wickets. Also a small amount of riprap is yet to be placed on the south embankment.

The electrical equipment at the lock is in working order and boats are passing this lock without interruption.

Contract No. 165

This contract is for removing the Montezuma aqueduct and completing the canal prism excavation from Sta. 5439 + 48, just east of the aqueduct, to Sta. 5550, near May's Point, and for dredging the canal prism between Stas. 5165 and 5202 + 62.89, near Fox Ridge. It was awarded to Mohawk Dredge & Dock Co., Inc., being signed on November 23, 1917. Construction work began in December, 1917. The engineer's preliminary estimate was \$84,530.00, the contractor's bid, \$160,943.00. The value of work done to date is \$116,680.

J. G. Palmer, Assistant Engineer, is in charge.

An extra work order dated February 11, 1918, provides that the fender piles at the railroad bridges on this contract be bolted, peeled and painted. This extra work is to be paid for at the actual cost of labor and materials plus 15 per cent.

The prism excavation is completed except cleaning up between Stas. 5463 and 5479, and between Stas. 5165 and 5202 + 63, and a small amount where the foundations of the aqueduct have not been removed. Nineteen spans of aqueduct masonry and trunk and 16 spans of foundation timbers have been removed.

The foundation piles between piers Nos. 9 and 23 have been pulled. There has been no delay to navigation during the fiscal year on this section.

Terminal Contract No. 28 — Cleveland

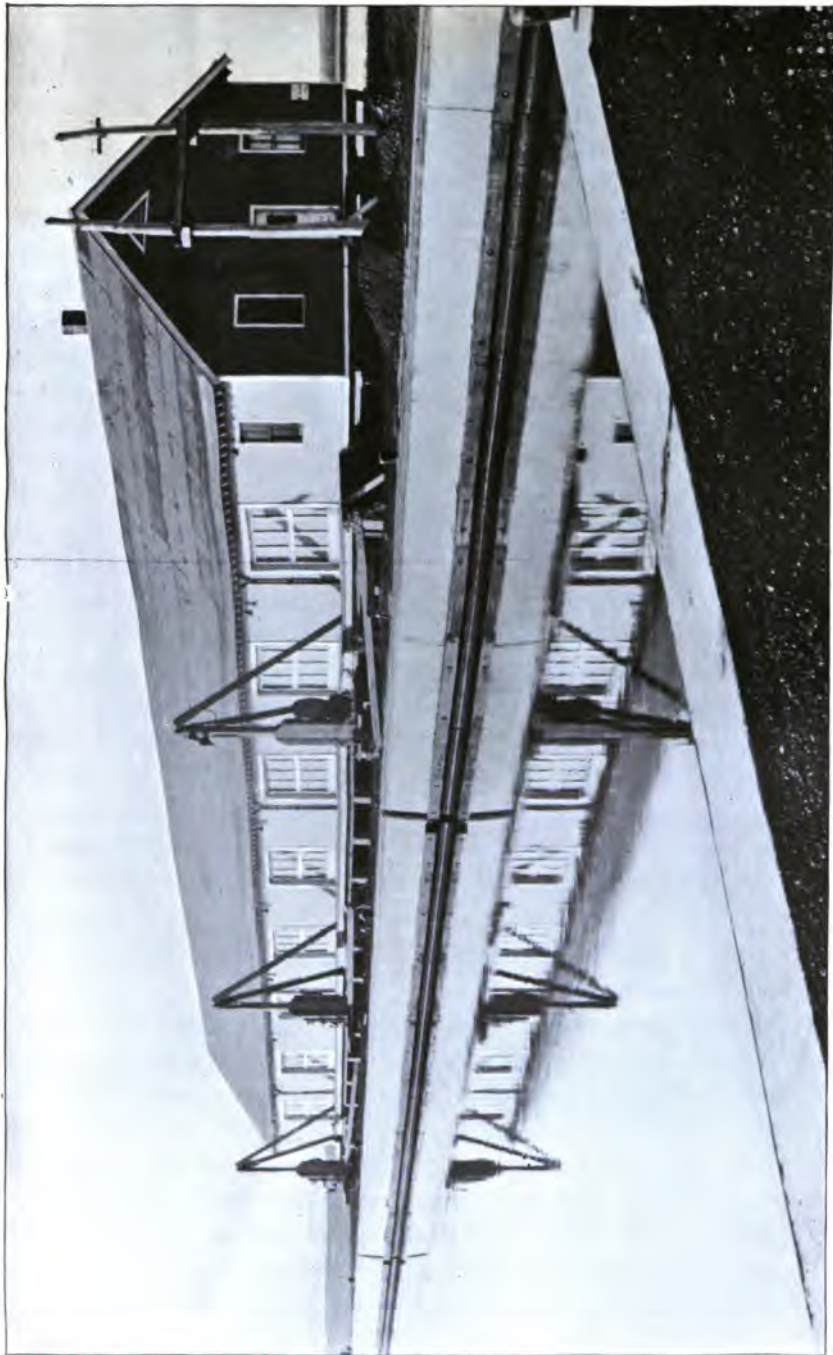
This contract is for constructing a harbor, dockwall and two breakwaters on Oneida lake at Cleveland. It was awarded to Clarence E. Gruner, being signed on February 15, 1915. It was assigned to Barrally & Ingersoll and this assignment was approved by the Superintendent of Public Works March 15, 1915. Construction work began June, 1915. The engineer's preliminary estimate was \$34,575.00, the contractor's bid, \$30,673.00. The contract price as modified by alterations Nos. 1 and 2 is \$37,222.00. Excess quantities to the value of \$1,675.00 have been authorized by the Canal Board. The value of work done during the year is \$3,320, total done to date, \$32,110. The amount paid on extra work orders is \$240.00, all prior to the present year.

W. J. Durkan, Assistant Engineer, is in charge.

Concrete tops have been placed on the west breakwater pier, finishing that pier. Four sections of concrete top have been placed on the east breakwater pier. Seven sections of concrete top are yet to be placed to finish this pier.

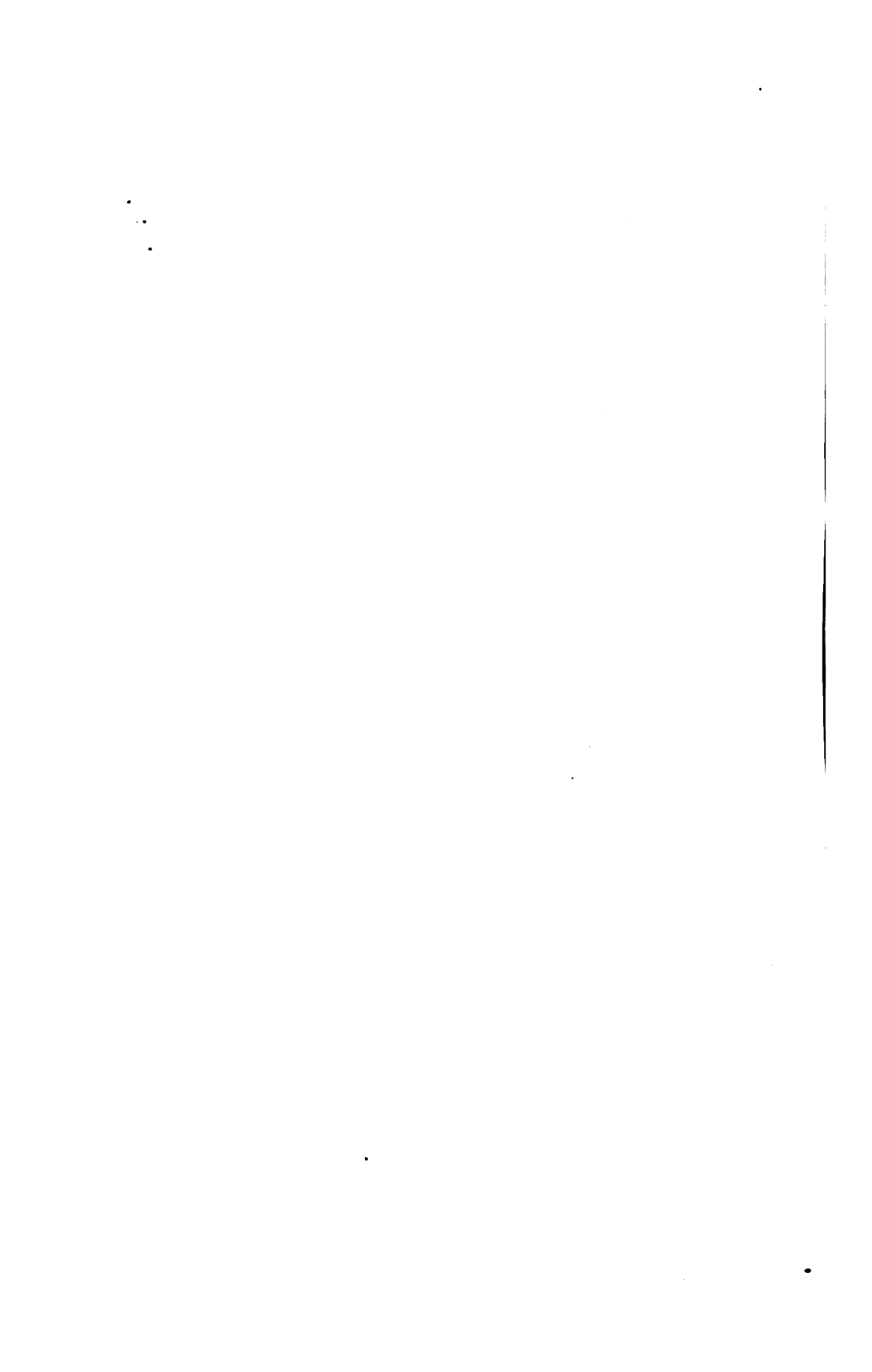
Terminal Contract No. 29 — Constantia

This contract is for constructing a harbor, dockwall and two breakwaters on Oneida lake at Constantia. It was awarded to Barrally & Ingersoll, being signed on November 27, 1914. The engineer's preliminary estimate was \$43,573.50, the contractor's bid, \$38,733.50. The contract price as modified by alteration No. 1 is \$39,793.50. This contract was canceled by the Canal Board August 8, 1917. No work had been done during the fiscal year.



WAREHOUSE AT THE SYRACUSE TERMINAL

The warehouse is situated on the south pier. The Syracuse terminal is one of the latest to be built and opened to traffic.



Terminal Contract No. 20 — Syracuse

This contract is for constructing a terminal basin with a connecting channel to Onondaga lake, also piers, dockwalls, spillway and a highway bridge at Syracuse. It was awarded to the Walsh Construction Co., Inc., being signed on November 4, 1915. Construction work began in same month. The engineer's preliminary estimate was \$665,875.00, the contractor's bid, \$419,659.00. The contract price as modified by alterations Nos. 1, 2 and 3 is \$566,753.26. Excess sheeting and bracing to the value of \$25,200.00 has been authorized by the Canal Board. The value of work done during the year is \$135,810, total done to date, \$513,690. The amount paid on extra work orders is \$1,174.50, all prior to the present year.

A. G. Card, Assistant Engineer, is in charge.

During the fiscal year a part of the salt sheds remaining on the terminal site was removed.

Excavation of the channel was resumed about July 15, 1917, by the 20-inch hydraulic dredge *Stanwix* and continued throughout the year except for four months during the winter. The 15-inch hydraulic dredge *Hanson* was also in use, excavating channel for three months during the fall of 1917. A drag-line excavator was in use about six months, excavating and trimming channel slopes, the material being cast over into the channel and rehandled by the dredge. Excavation of the channel south of the Hiawatha street turning basin and of the harbor slips was completed.

The Hiawatha street bridge has been completed and embankment in both approaches finished. Gravel surfacing was placed on both approaches. Paved gutters were laid on both sides of the east approach and 4-inch tile drains, covered with crushed stone, were placed at both wing-walls of the east bridge pier and east abutment.

The dockwalls were completed previous to June 30, 1917, but no excavation was allowed except for the material used to back-fill the wall. The remainder of the material for surfacing along dockwall and for grading beyond the limit of surfacing was cast over to the area to be excavated for slips and was removed by the dredge during the past year. Excavation for surfacing was com-

pleted and only a small amount remains to be done beyond the limit of surfacing.

Cinder surfacing 18 inches thick was placed on piers and on an area 60 feet wide along the walls. At the south dock, the approach and the north dock, surfacing has been completed, except rolling. Mill cinders are being substituted for gravel for surfacing on account of the inability of the contractor to obtain satisfactory gravel.

The Public Works slip near Hiawatha street has been completed.

The drainage system of this terminal includes ditches along the State's right of way at the harbor, and catch-basins and outlets through the dockwalls and 24-inch tile drain along the south side of Hiawatha street west of the terminal channel. This drainage system has been completed.

Terminal Contract No. 213

This contract is for constructing a frame freight-house and four electrically-operated timber derricks at Syracuse. It was awarded to the Savage Construction Company, being signed on February 14, 1918. Construction work began shortly after award. The engineer's preliminary estimate was \$28,200.00, the contractor's bid, \$27,032.00. The contract price as modified by alteration No. 1 is \$26,997.00. The value of work done during the year is \$14,530, total done to date, the same.

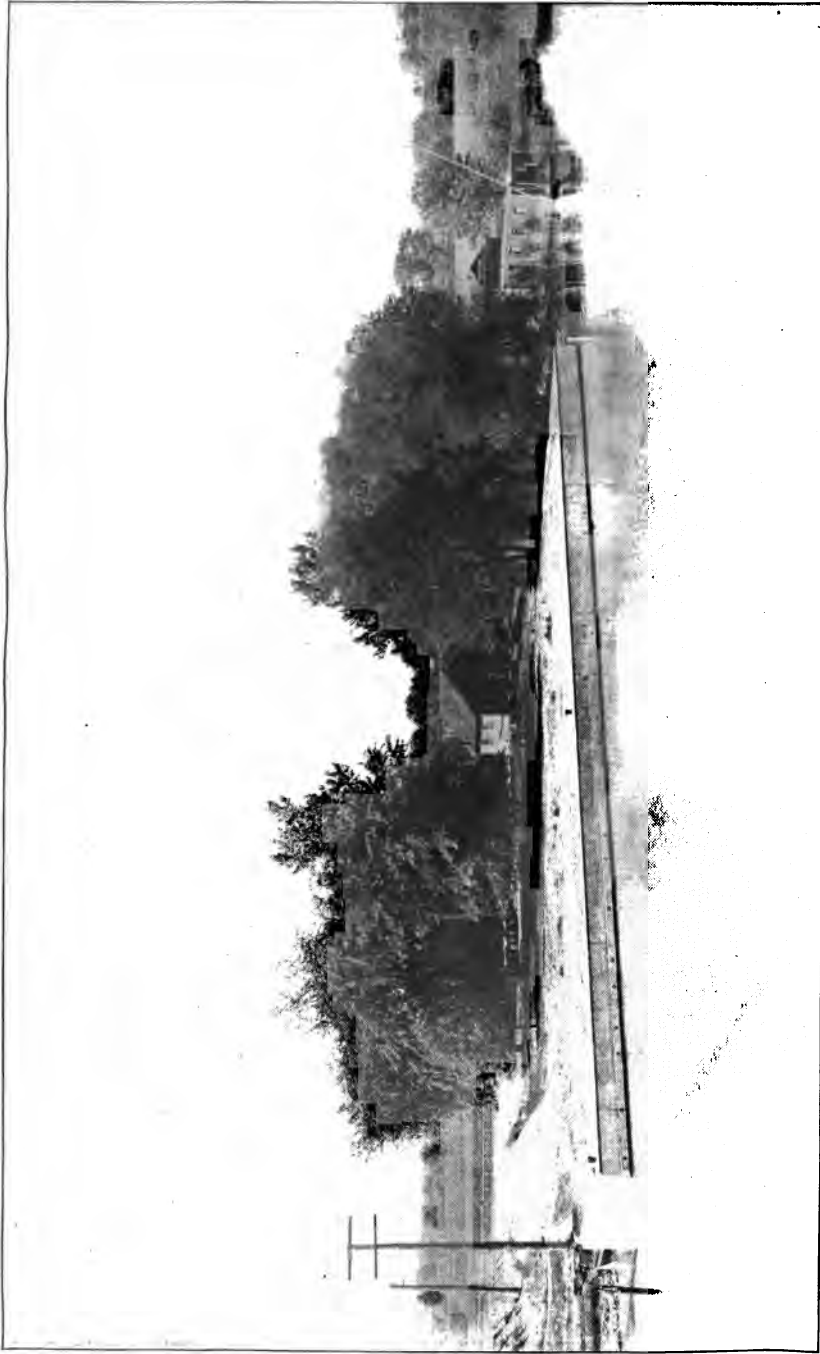
A. G. Card, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board July 24, 1918, provides for changes in electrical installation. It decreases the contract price by \$35.00.

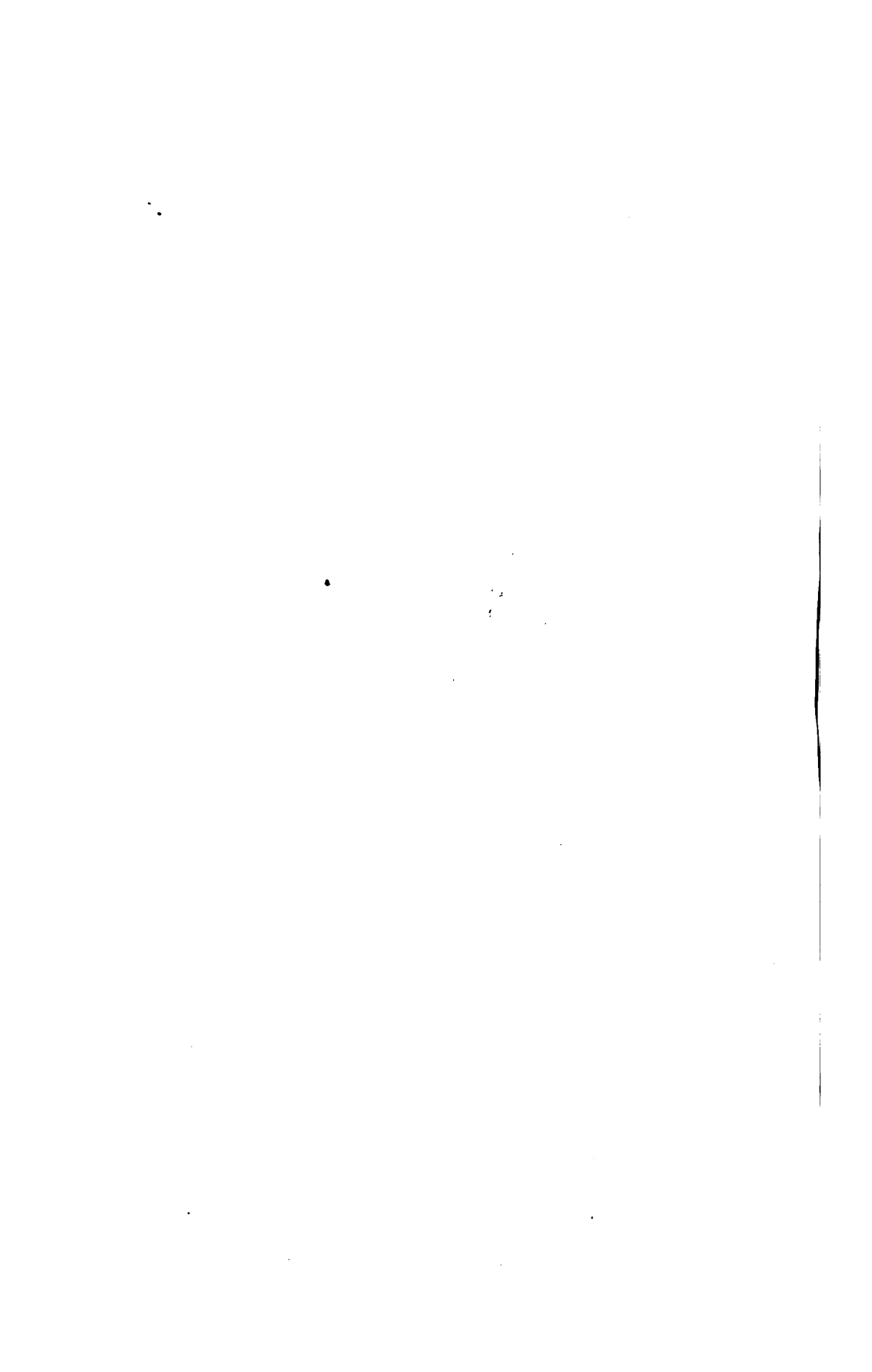
The carpenter work is completed, except the hanging of two freight-house doors and a few of the door-guards. The electric lighting system is also completed except the placing of fixtures. Painting is nearly completed.

Terminal Contract No. 106

This contract is for furnishing fourteen two-ton steam tractor cranes for Barge canal terminals. One of these is for the Syracuse terminal. The contract was awarded to the John F. Byers Machine Co., being signed on February 14, 1918. The engineer's preliminary estimate was \$5,250.00 per crane, the contractor's



BARGE CANAL TERMINAL AT WEEDSPORT
View showing completed dockwall and graded area.



bid, \$5,265.00 per crane. The contract price as modified by alteration No. 1 is \$5,515.00 per crane.

Alteration No. 1, approved by the Canal Board March 27, 1918, provides for housing the fourteen cranes under this contract. It increases the contract price by \$250.00 per crane.

This crane has not been delivered.

• OSWEGO CANAL RESIDENCY

Senior Assistant Engineer Edward J. Berry reports:

This residency comprises all the work on the Oswego canal. Reports follow on contracts Nos. 99, 117, 139 and 167, part of No. 153, and terminal contracts Nos. 30, 33, 33-P, 59 and 60, and part of No. 106.

Contract No. 153

The portion of contract No. 153 affecting this residency is for furnishing and delivering at Phoenix 174 oil-burning lanterns for buoy, stake and bridge lights on the Oswego river. It was awarded to R. B. Wing & Son, being signed on February 28, 1917. The engineer's preliminary estimate was \$12.00 per lantern, or \$2,088.00 for this residency, the contractor's bid, \$12.54 per lantern, or \$2,181.96 for this residency. On October 3, 1917, the Canal Board accepted the work and approved the final account, the amount being the same as the contractor's bid.

N. R. McLoud, Assistant Engineer, was in charge.

The lanterns were duly delivered.

Contract No. 167

This contract is for constructing a bascule bridge below lock No. 1, at Culvert street, Phoenix. It was awarded to Walter S. Rae, being signed on October 13, 1917. Construction work began in May, 1918. The engineer's preliminary estimate was \$26,653.60, the contractor's bid, \$26,689.30. The value of work done to date is \$1,000.

N. R. McLoud, Assistant Engineer, is in charge.

Excavation for the south pier of the west abutment is nearly completed. Sand and gravel for concrete is being hauled to the site.

Contract No. 117

This contract is for constructing a swing-bridge over lock No. 2 at Fulton. It was awarded to Walter S. Rae, being signed on April 15, 1918. The engineer's preliminary estimate was \$34,713.30, the contractor's bid, \$36,513.80.

H. H. Brown, Assistant Engineer, is in charge.

Contract work has not been started.

Contract No. 99

This contract is for constructing portions of a bridge over the Oswego river at Minetto. It was awarded to Larkin and Sangster, being signed on September 12, 1916. The engineer's preliminary estimate was \$117,170.75 (\$73,082.60 for the steel span and \$44,088.15 for the arch span and approach), the contractor's bid, \$115,980.75 (\$72,992.60 for the steel span and \$42,988.15 for the arch span and approach). The value of work done during the year is \$70,590 (\$56,630 for the steel span and \$13,960 for the arch span and approach), total done to date, \$87,000 (\$56,960 for the steel span and \$30,040 for the arch span and approach). The amount paid on extra work orders during the year is \$738.53, total to date, the same.

Edw. M. Ellis, Assistant Engineer, is in charge.

An extra work order dated November 28, 1916, provides for repairs to water intake pipe at the southerly end of the Minetto retaining wall. The final account, amounting to \$738.53, was approved by the Canal Board September 5, 1917.

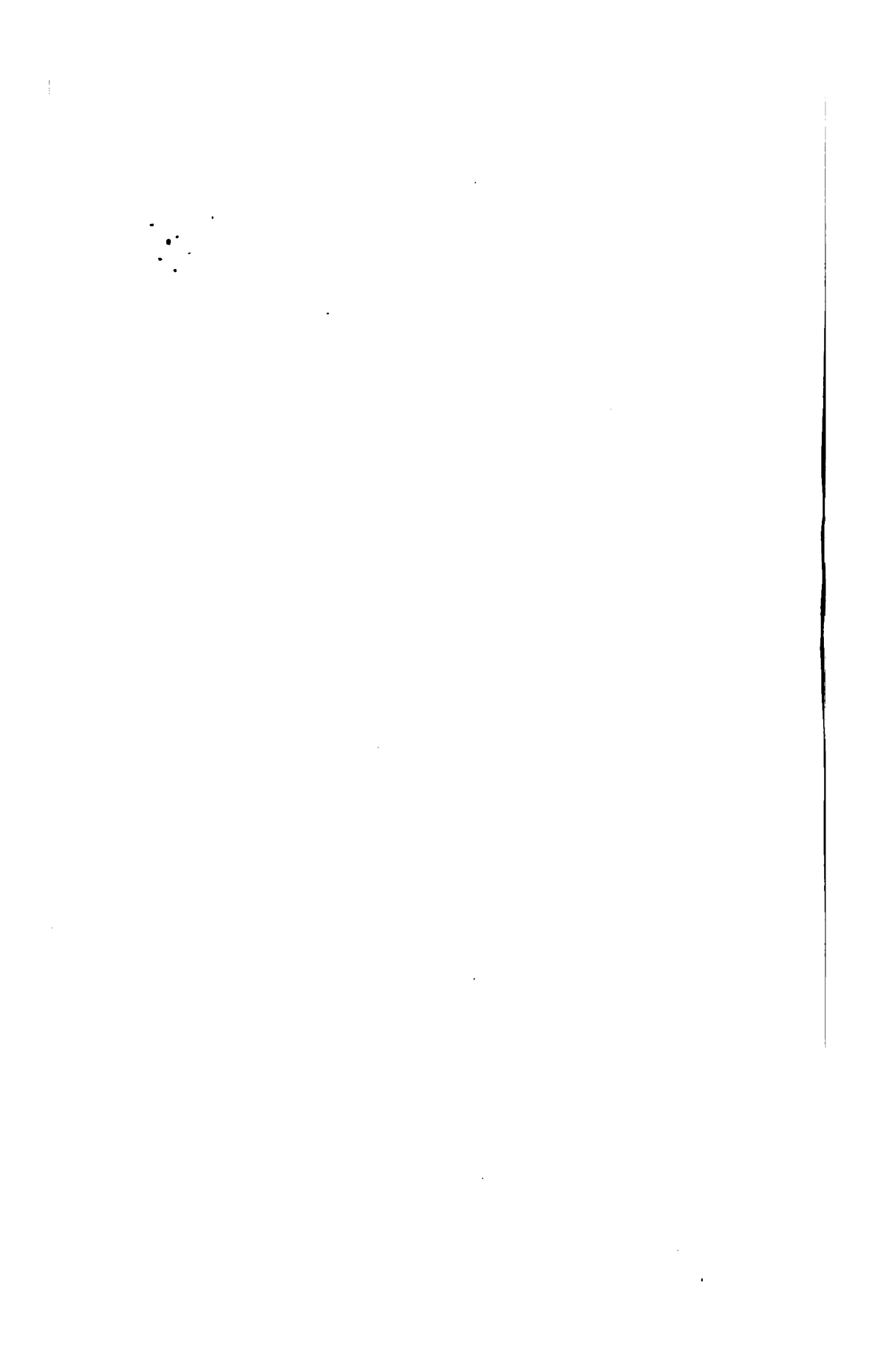
This bridge consists of a 70-foot reinforced concrete arch span and a steel span so constructed that it may be converted into a single-leaf bascule lift with clear opening of 135 feet. These spans, together with three reinforced arches having spans of about 90, 100 and 110 feet, respectively, built by the towns, constitute the complete bridge over the Oswego river.

During the past year the contractor has finished the greater part of the contract. The curved retaining walls, the concrete arch of 70 feet span, the bascule pit, the concrete balustrades, part of the sidewalk and about 50 per cent of the subbase for the pavement have been completed this year. In addition, the steel



WEST APPROACH TO MINNETTO BRIDGE

The approach, the arch span, the counterweight pit and the steel span, convertible to a bascule, were built by the State; the three arch spans beyond (not shown here) were built by the towns situated on the respective sides of the river.



span over the river channel of the Barge canal has been erected and partly riveted.

The work has progressed slowly, due to labor shortage and other causes brought about by general conditions. However, all the material for finishing the work is now on the ground and its rapid completion may be expected.

Contract No. 139

This contract is for excavating a channel in the Oswego river from the lower end of lock No. 8, at Oswego, to deep water. It was awarded to H. S. Kerbaugh, Inc., being signed on November 3, 1916. On July 3, 1917, it was assigned to the Empire Engineering Co., Inc., and this assignment was approved by the Superintendent of Public Works August 14, 1917. Construction work began October 29, 1916. The engineer's preliminary estimate was \$25,280.00, the contractor's bid, \$25,912.00. The value of work done during the year is \$707. The work was accepted October 3, 1917, and the final account, amounting to \$17,836.64, was approved by the Canal Board October 23, 1917.

George H. Haley, Assistant Engineer, was in charge.

The channel has been swept, all obstructions removed and the contract completed.

Terminal Contract No. 30 — Oswego, River Terminal

This contract is for constructing a dockwall, an approach to the terminal and appertaining structures on the east side of the Oswego river between Schuyler and Cayuga streets, Oswego. It was awarded to Henry P. Burgard, being signed on March 24, 1916. Construction work began in April, 1916. The engineer's preliminary estimate was \$103,700.00, the contractor's bid, \$90,984.00. The contract price as modified by alterations Nos. 1, 2 and 3 is \$106,166.70. The value of work done during the year is \$24,480, total done to date, \$96,180. The amount paid on extra work orders during the year is \$551.50, total to date, \$1,406.50.

George H. Haley, Assistant Engineer, was in charge.

Alteration No. 3, approved by the Canal Board June 5, 1918, provides for reducing the quantity of embankment and for substituting brush treatment for tank treatment of sawed lumber. It decreases the contract price by \$416.40.

An extra work order dated November 14, 1916, provides for building a temporary timber flume to carry the ice and rubbish away from the head-race of the People's Gas and Electric Co. and to remove this flume when it is no longer required, also for the construction of a new vertical wall along the westerly side of the hydraulic canal. The final account, amounting to \$950.00, was approved by the Canal Board February 13, 1918.

An extra work order dated March 1, 1918, provides for certain changes to the culvert entrance and gate at the northerly end of the hydraulic canal and for removing and later rebuilding an old bridge belonging to the city of Oswego. The final account, amounting to \$456.50, was approved by the Canal Board April 24, 1918.

The dockwall, highway retaining wall and the hydraulic canal wall were completed in October, 1917. This finished the concrete work. The highway approach to the dock was finished and fender timbers were placed on the dockwall. The coffer-dam in the river was removed, a little of the material being used to complete the fill behind the dockwall and the remainder being spoiled either in Lake Ontario or in the Oswego river above dam No. 6. The work was practically finished in November.

The removal of the temporary timber flume constructed under the work order of November 14, 1916, was taken over by the owners of the property on which it was located.

The work under the extra work order of March 1, 1918, has also been finished.

Terminal Contract No. 33 — Oswego, Lake Terminal

This contract is for constructing a terminal pier, excavating channels, removing a portion of the U. S. breakwater, etc., at the foot of West First street, Oswego. It was awarded to H. S. Kerbaugh, Inc., being signed on July 10, 1914. Construction work began August 15, 1914. The engineer's preliminary estimate was \$415,420.00, the contractor's bid, \$348,684.50. The contract price as modified by alteration No. 1 is \$351,175.50. The value of work done during the year is \$448. The work was accepted October 31, 1917, and the final account, amounting to \$333,388.36, was approved by the Canal Board July 17, 1918.



WEST END OF BRIDGE AT MINNETTO

This type of approach was made necessary so as to maintain proper grades in the village street. The construction is reinforced concrete.

The amount paid on extra work orders during the year is \$4,863.90, total to date, the same.

George H. Haley, Assistant Engineer, was in charge.

An extra work order dated September 21, 1917, provides for furnishing labor and materials necessary to enclose the ends of the U. S. breakwater. The final account, amounting to \$4,863.90, was approved by the Canal Board January 16, 1918.

The contract work was finished by July 1, 1917.

The permit issued by the U. S. Government for the removal of a portion of its breakwater across the site of the terminal pier stipulated that the ends of the inner breakwater at this opening should be built up and provided with fenders. A close row of piles was driven around the ends of the piers, the enclosed space filled in and fender timber bolted in place. This work was done under the extra work order.

Terminal Contract No. 33-P

This contract is for paving part of the terminal pier at Oswego. It was awarded to Guy B. Dickison, being signed on May 7, 1918. The engineer's preliminary estimate was \$11,010.00, the contractor's bid, \$11,730.00.

George H. Haley, Assistant Engineer, is in charge.

No contract work has been done to date, but preparations for starting are now in progress.

Terminal Contract No. 59

This contract is for constructing a railroad track approach to the terminal pier at Oswego. It was awarded to W. F. Martens, being signed on May 6, 1918. The engineer's preliminary estimate was \$5,100.00, the contractor's bid, \$6,516.00. The value of work done to date is \$1,620.00

George H. Haley, Assistant Engineer, is in charge.

Construction work began in May, 1918, and has continued to date. Excavation for track has been completed and ties and rails laid the entire length of the contract. A No. 8 turnout has been assembled and laid and connection made with the D., L. & W. R. R. Only a part of the ballast has arrived to date and the track has not been ballasted nor brought to final alignment.

Terminal Contract No. 60

This contract is for constructing railroad and crane tracks on the terminal pier at Oswego. It was awarded to W. F. Martens, being signed on May 6, 1918. The engineer's preliminary estimate was \$8,365.00, the contractor's bid, \$9,690.00. The value of work done during the year is \$3,410, total done to date, the same.

George H. Haley, Assistant Engineer, is in charge.

Construction work began in May, 1918, and has continued to date. Excavation for tracks has been made and ties and rails placed, but ballasting and final alignment of tracks has not yet been done.

Terminal Contract No. 106

This contract is for furnishing fourteen two-ton stream tractor cranes for Barge canal terminals. One of these is for use at Oswego. The contract was awarded to the John F. Byers Machine Co., being signed on February 14, 1918. The engineer's preliminary estimate was \$5,250.00 per crane, the contractor's bid, \$5,265.00 per crane. The contract price as modified by alteration No. 1 is \$5,515.00 per crane. The value of work done at Oswego during the year is \$4,210.00, done to date, the same.

Alteration No. 1, approved by the Canal Board March 27, 1918, provides for housing the fourteen cranes under this contract. It increases the contract price by \$250.00 per crane.

One crane was delivered at Oswego May 31, 1918.

CAYUGA AND SENECA CANAL RESIDENCY

Senior Assistant Engineer H. C. Smith reports:

This residency comprises all the work on the Cayuga and Seneca canal. Reports follow on contracts A-1, F, L, M, P and R and an extra work order on contract C, which was not settled last year, and also on the several railroad crossings.

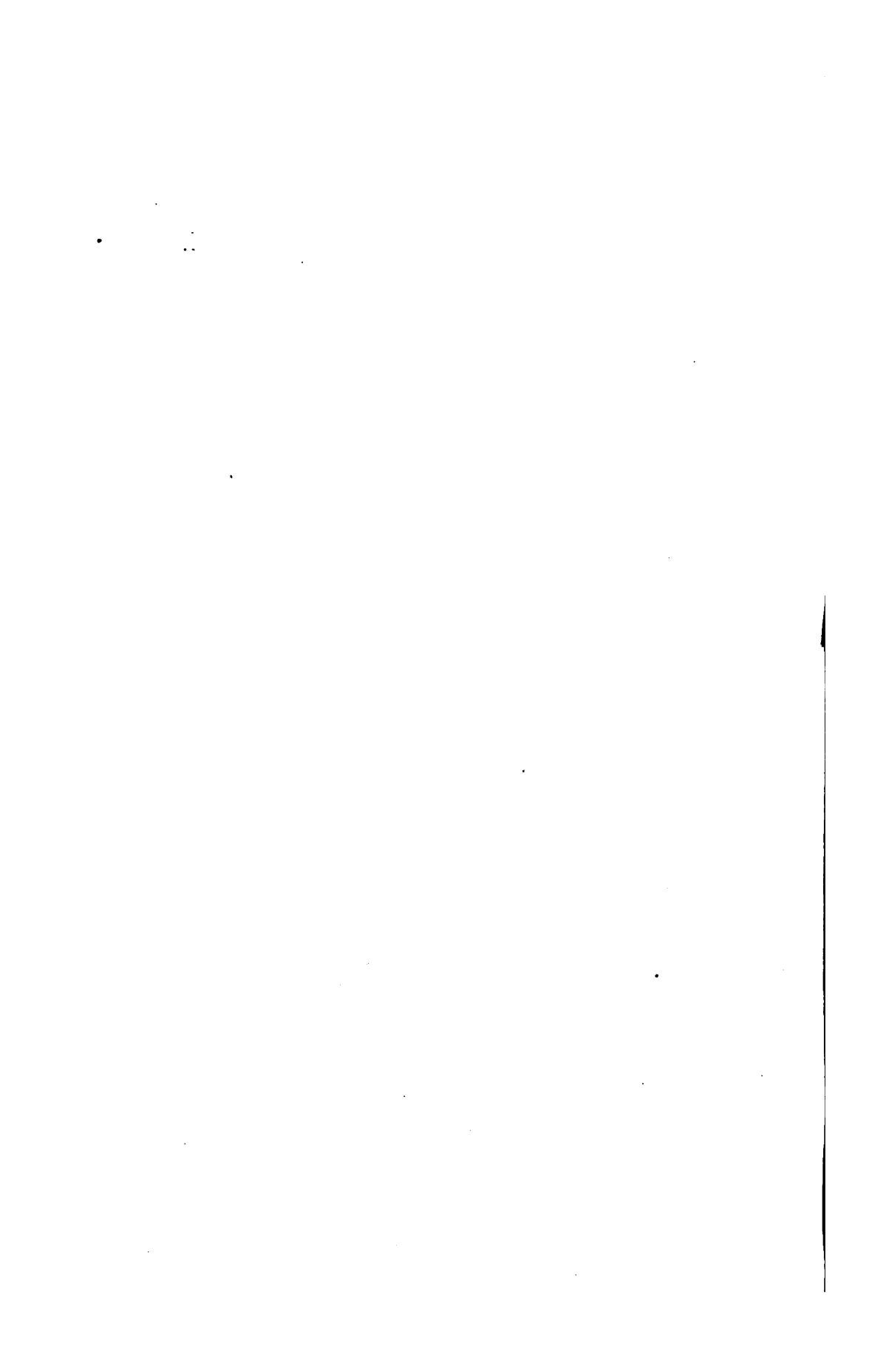
Contract F

This contract is for constructing the substructures, superstructures and approaches of the three following bridges: Free bridge, Demont's bridge and Lake road bridge. It was awarded



BARGE CANAL TERMINAL AT OSWEGO (RIVER TERMINAL)

This terminal is for local rather than transfer traffic. The view shows well the approach, which, because of difficult grades and an intervening raceway, had to extend over a bridge and down a long incline.



to the Stanley Construction Company, being signed on July 20, 1914. Construction work began March 19, 1915. The engineer's preliminary estimate was \$126,263.00, the contractor's bid, \$119,913.00. The contract price as modified by alterations Nos. 1 and 2 is \$142,578.70. The value of work done during the year is \$7,240. The work was accepted December 4, 1917, and the final account, amounting to \$127,399.75, was approved by the Canal Board February 13, 1918.

L. L. Hadley, Assistant Engineer, was in charge.

At Free bridge and at Lake road bridge the concrete floors with bituminous surfacing were placed, approach fills were completed, gravel lining was placed for road surfacing and wooden fence was completed. At Free bridge riprap was placed around the east abutment. At Lake road pipe railing was placed on the south wing of the east abutment.

At Demont's bridge the old temporary bridge was removed.

Contract R

This contract is for completing the unfinished work at several locations on the Cayuga and Seneca canal. It was awarded to the Sherman-Stalter Co., being signed on April 30, 1918. Construction work began on May 22, 1918. The engineer's preliminary estimate was \$185,259.00, the contractor's bid, \$180,122.80. The value of work done to date is \$15,170.

L. L. Hadley, Assistant Engineer, is in charge.

Part of the prism at Mud lock was excavated and some of the spoil in Cayuga lake that had been originally excavated by a dipper-dredge was removed. The excavation at the upper side of the New York Central railroad bridge, $2\frac{1}{2}$ miles east of Seneca Falls, was nearly finished and all the hydraulic excavation at the two Lehigh Valley railroad bridges near Seneca lake was made. This work was done with the hydraulic dredge *Clyde*.

At Free bridge a part of the old temporary highway bridge was removed and at Mud lock the old lock walls were drilled and blasted.

The dipper-dredge *Erie* has been brought to the site of the contract and set up ready for work at Mud lock.

Contract A-1

This contract is for making repairs to and constructing a fish-ladder around dam No. 1, near Cayuga. It was awarded to the Sherman-Stalter Company, being signed on July 24, 1916. Construction work began August 21, 1916. The engineer's preliminary estimate was \$29,019.30, the contractor's bid, \$25,831.05. The contract price as modified by alteration No. 1 is \$26,842.50. Excess metal reinforcement to the value of \$28.00 has been authorized by the Canal Board. The value of work done during the year is \$610, total done to date, \$24,750. On January 23, 1918, the Canal Board accepted the work and approved the final account, which amounted to \$24,749.82.

C. H. Swick, Assistant Engineer, was in charge.

The contract work was finished last year, but some cleaning up remained to be done.

Contract M

This contract is for constructing power-plants and for furnishing and installing electrical equipment and machinery for operating and lighting locks Nos. 1, 2, 3 and 4. It was awarded to Lupfer & Remick, being signed on November 5, 1914. Construction work began January 23, 1915. The engineer's preliminary estimate was \$176,087.00, the contractor's bid, \$188,031.00. The contract price as modified by alteration No. 1 is \$191,436.00. Excess chipping concrete to the value of \$360.00 has been authorized by the Canal Board. The value of work done during the year is \$21,000, total done to date, \$186,100.

C. H. Swick, Assistant Engineer, was in charge until September 1, 1917, at which date the work was taken over by M. L. Babcock, Junior Assistant Engineer.

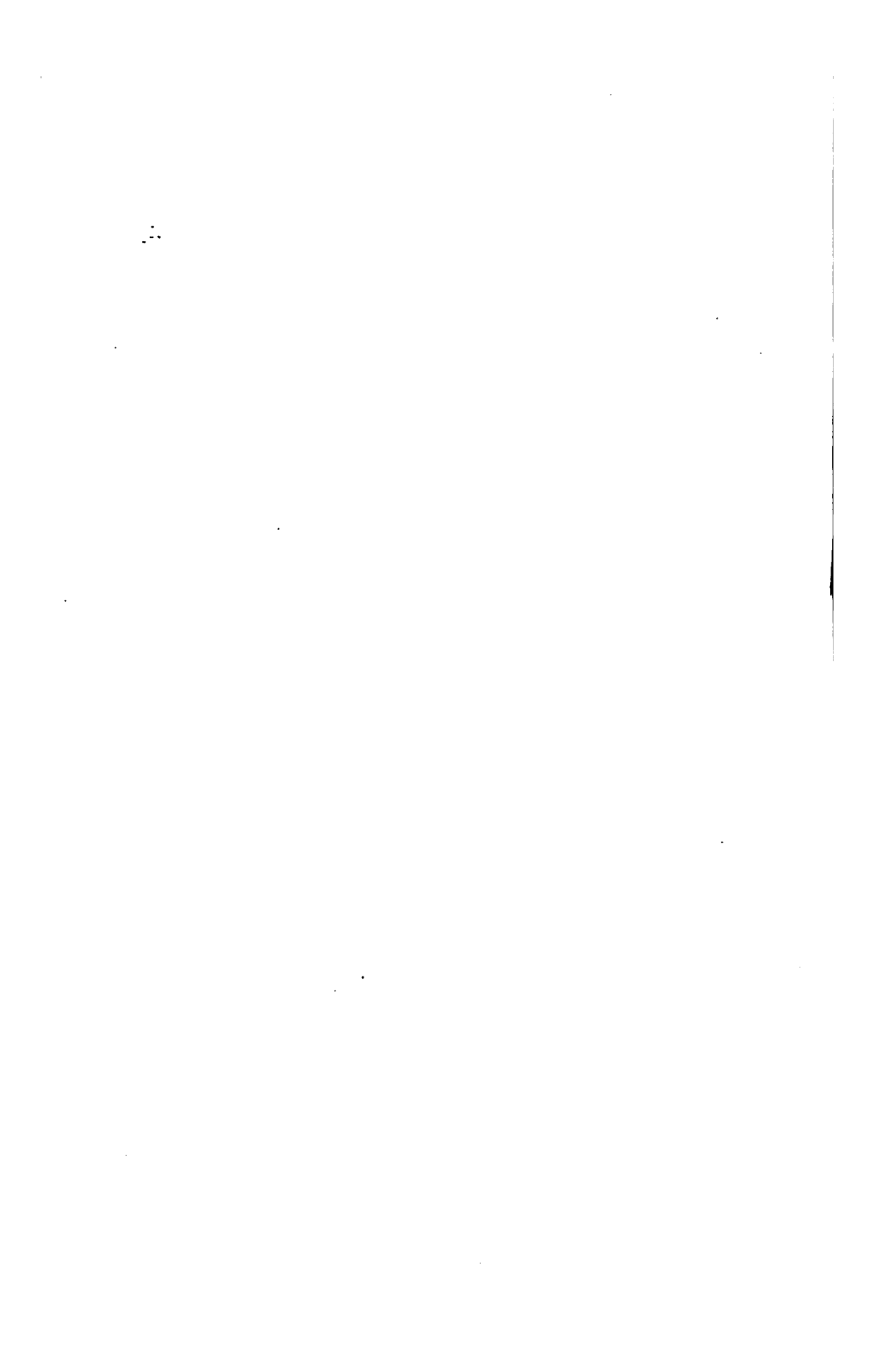
An extra work order dated March 16, 1918, provides for changing the trash racks at lock No. 2, payment to be made on the basis of cost plus 15 per cent. The estimated cost is \$221.35.

During the year the installation of the hydraulic equipment has been completed and all the electrical equipment in the powerhouse at dam No. 2 has been installed. After connecting and adjusting the electrical machinery and equipment that had been



BARGE CANAL TERMINAL AT OSWEGO (LAKE TERMINAL)

The canal pier, which is the one with the boats lying alongside, is 1,010 feet long and has rail connections. It is the point of transfer between the canal line and lake and rail lines.



installed on locks Nos. 2 and 3, the power-plant was placed in operation and the tests were run.

The contract was practically completed in May, 1918. About 95 per cent of the final estimate has been prepared.

The extra work order was made necessary by the imperfect lines of the guide-grooves left in the concrete at the time of building the dam. The reservoir having been filled at an early date, no opportunity was given for chipping out these guides. The racks have been changed, but the account has not been rendered.

Contract C

This contract was for constructing two locks, a dam, etc., at Seneca Falls. Larkin & Sangster were the contractors. The contract was finished and the final account approved by the Canal Board prior to this year, but an extra work order dated October 5, 1915, had not been settled. This work order provides for repairing embankment south of lock No. 3, and constructing a concrete apron below dam No. 2. The final account, amounting to \$8,565.05, was approved by the Canal Board September 18, 1917. The amount paid on extra work orders during the year is \$284.51, total to date, \$70,193.91.

No work was done during the year.

Contract P

This contract is for constructing a concrete cut-off wall below the walls of lock No. 3, Seneca Falls. It was awarded to The Foundation Company, being signed on June 8, 1917. The engineer's preliminary estimate was \$76,412.50, the contractor's bid, \$82,850.00. Excess quantities to the value of \$17,600.00 have been authorized by the Canal Board. The value of work done during the year is \$98,372. The work was accepted March 13, 1918, and the final account, amounting to \$98,372.32, was approved by the Canal Board May 1, 1918. The amount paid on extra work orders during the year is \$9,510.74, total to date, the same.

L. W. Bentley, Junior Assistant Engineer, was in charge.

An extra work order dated December 1, 1917, provides for constructing a concrete cut-off wall under the core wall of the earth dam at lock No. 3 and for digging test pits in the bottom of the tunnels. The final account, amounting to \$6,317.69, was approved by the Canal Board April 24, 1918.

An extra work order dated January 8, 1918, provides for removing rubbish and repairing floor of lock No. 3. The final account, amounting to \$3,193.05, was approved by the Canal Board April 24, 1918.

The contract proper consisted in constructing a concrete cut-off wall, 4 feet wide and from 10 to 15 feet high, under the upper end of lock No. 3, where the rock foundation developed porous places. In plan this cut-off wall is the shape of a horseshoe with the bend of the horseshoe under the upper breast-wall and the ends extending under the north and south lock walls some 200 feet. The top of this cut-off wall is in contact with the bottom of the original lock walls. The work was done under air pressure by sinking a shaft on the south side of the lock to the lowest level of the bottom of the tunnel, then a connecting tunnel was driven to a point midway under the near lock wall and from here the actual work on the cut-off wall was started, working two headings, one to the right and one to the left. At first the lower portion of the tunnel about 6 feet high was driven all the way around. As this progressed, at intervals of about eight feet, test holes were drilled in the roof upward to the concrete lock walls and grouted. After this pilot tunnel had been completed the rock was stoped down from the roof in sections, working from both ends back to the connecting tunnel. As the excavation for a section was finished, that section of tunnel was filled with concrete.

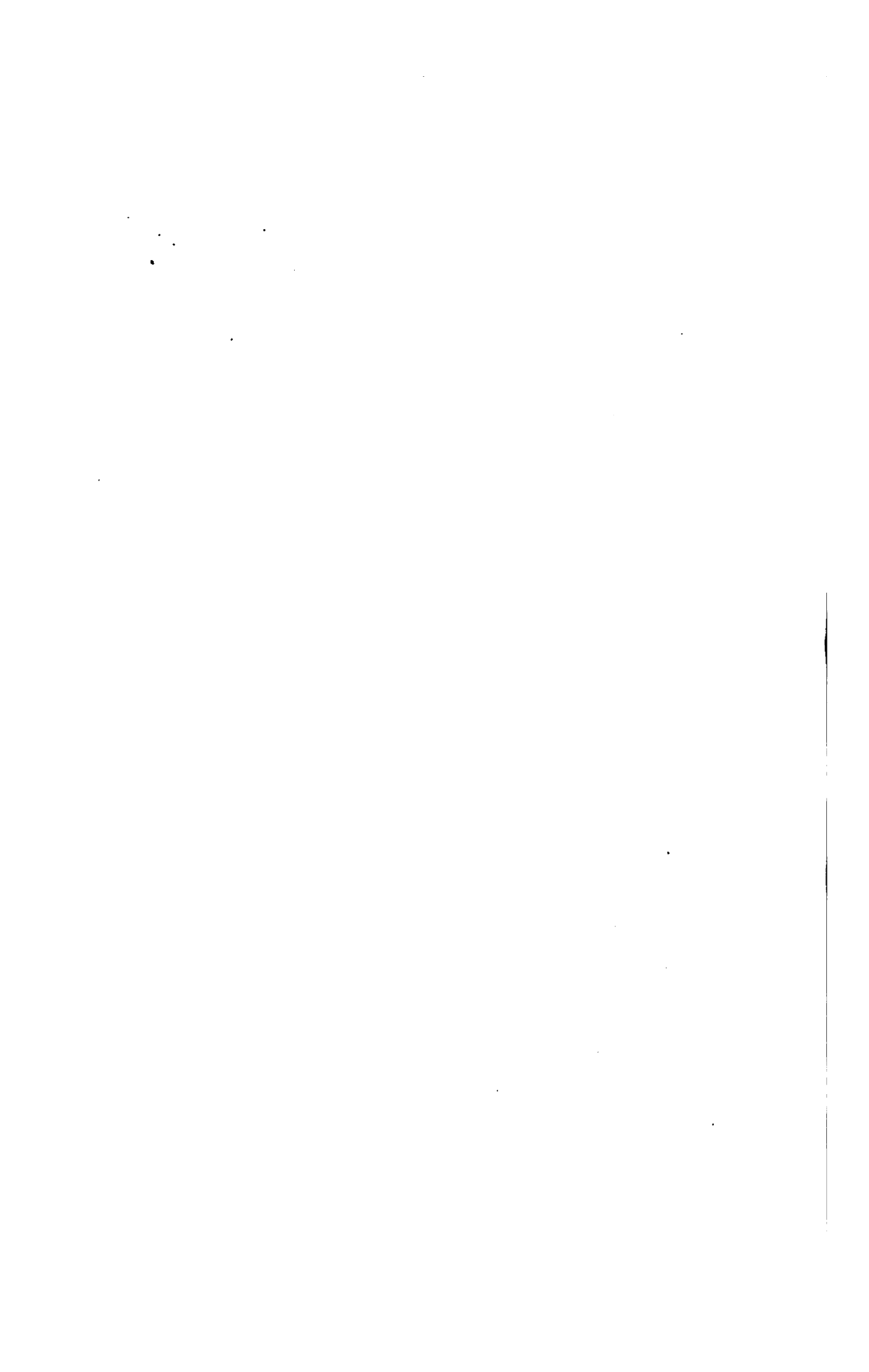
Contract I

This contract is for constructing substructures, superstructures and approaches of two highway bridges, one at Gorham street, Waterloo, and the other at Kingdom road, between Waterloo and Seneca Falls. It was awarded to Scott Brothers, being signed on September 23, 1915. Construction work began October 5, 1915. The engineer's preliminary estimate was \$71,469.25, the contractor's bid, \$59,928.40. The value of work done during



"FREE" BRIDGE OVER THE SENECA RIVER

This bridge has steel girder approach spans, which rest on columns at the land ends. This design, which permits a shorter main span and rippapped embankments with natural slopes, is advisable because of soft foundations.



the year is \$539. On October 3, 1917, the Canal Board accepted the work and approved the final account, which amounted to \$53,549.16.

C. H. Swick, Assistant Engineer, was in charge.

At Kingdom road bridge some lining was placed on the south approach and the fourth-class riprap northwest of the bridge was arranged. This work, done before July 20, 1917, completed the contract.

Railroad Crossings

N. Y. C. R. R. bridges at Cayuga. About the middle of September, 1917, work was started on the foundations for the new three-span bridge over the Barge canal. The substructures for this bridge were completed and made ready for the steel. The abutments at the old lift-bridge were enlarged to meet the new grade. The yards at Cayuga were raised. Six of the ten old lake bridge spans were filled in with earth and the trusses removed. Both approaches to the new main bridge were graded and practically all ballasting has been completed. On June 14, 1918, work was started on the construction of a 60-foot flood-span near the west side of Cayuga lake.

N. Y. C. R. R. bridge at Demont's. Early in September, 1916, work was started on rebuilding this bridge across the canal about $2\frac{1}{2}$ miles east of Seneca Falls. During the past year the new east span was completed, the old west span was moved into position upon the new substructure, and traffic was turned over the new location on May 10, 1918.

L. V. R. R. bridges near Geneva. Late in August, 1916, work was started on changing the Lehigh Valley bridges over the canal near the outlet of Seneca lake. During the past year both abutments of the main line bridge were underpinned with concrete down to an elevation several feet below canal grade. The abutments and back-fill for the Ithaca branch bridge were completed and the new steel girder span was erected, thus completing the work at both of these bridges except for removing the old pier of the Ithaca branch bridge.

THE FOLLOWING STATEMENTS SHOW THE NAMES, RANK AND COMPENSATION OF ENGINEERS EMPLOYED IN THE MIDDLE DIVISION OF THE DEPARTMENT OF THE STATE ENGINEER AND SURVEYOR, TOGETHER WITH INCIDENTAL EXPENSES, FOR THE FISCAL YEAR ENDED JUNE 30, 1918.

Ordinary Repairs to Canals — Erie Canal

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
Guy Moulton.....	Division engineer.....	\$4,800 per year	\$1,200 00		\$1,200 00
E. J. Berry.....	Senior assistant engineer.....	3,300 per year	493 76		493 76
I. S. Ba'ger.....	Assistant engineer.....	2,580 per year	207 83		207 83
Carl L. Bannister.....	Assistant engineer.....	2,580 per year	410 00		410 00
W. J. Durkan.....	Assistant engineer.....	2,580 per year	165 30		165 30
C. W. Costello.....	Assistant engineer.....	2,580 per year	157 67	\$1 02	158 69
R. K. Sheldon.....	Assistant engineer.....	2,580 per year	495 00	35 15	530 15
David R. Lee.....	Assistant engineer.....	2,340 per year	536 35	6 00	542 35
E. L. Keeler.....	Junior assistant engineer.....	1,800 per year	185 00		185 00
Carl F. Hopstein.....	Junior assistant engineer.....	1,800 per year	237 74		237 74
J. J. Ryan.....	Junior assistant engineer.....	1,800 per year	352 33		352 33
J. H. Forth.....	Junior assistant engineer.....	1,440 per year	240 00		240 00
J. P. Walsh.....	Junior assistant engineer.....	1,440 per year	165 55		165 55
F. D. Pieri.....	Engineering assistant.....	840 per year	28 00		28 00
H. L. Bassett.....	Cashier.....	1,800 per year	600 00		600 00
W. S. Morris.....	Estimate clerk.....	2,100 per year	1,725 00	9 19	1,734 19
Harvey Wagner.....	Stenographer.....	1,500 per year	500 00		500 00
C. W. Chase.....	Chauffeur.....	1,500 per year	480 00		480 00
John Connors.....	Janitor.....	1,200 per year	200 00		200 00
C. H. Osterhout.....	Foreman.....	900 per year	93 15		93 15
Margaret Sheridan.....	Telephone operator.....	720 per year	120 00		120 00
E. F. Allen.....	Laborer.....	2 50 per day	62 50		62 50
C. Plummer.....	Laborer.....	2 50 per day	82 50		82 50
C. H. Norton.....	Laborer.....	2 50 per day	65 00		65 00
<i>Incidental Expenses</i>			\$8,792 68	\$51 36	\$8,844 04
Stationery and printing.....				41 71	
Livery.....				30 00	
Postage.....				97 04	
Telephone and telegraph.....				57 80	
Miscellaneous.....				563 10	
Total.....					789 65
					\$9,633 69

Ordinary Repairs to Canals — Black River Canal

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
E. J. Berry.....	Senior assistant engineer.....	\$3,300 per year	\$127 50	\$6 83	\$134 33
Carl F. Hopstein.....	Junior assistant engineer.....	1,500 per year	172 93	23 93	196 86
Total.....			\$300 43	\$30 76	\$331 19

Construction of Barge Canal—Erie Canal

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
Guy Moulton	Division engineer	\$4,800 per year	\$900 00	\$112 77	\$1,012 77
E. J. Berry	Senior assistant engineer	3,300 per year	911 52	105 24	1,016 76
James Burden	Senior assistant engineer	3,080 per year	2,155 16	150 00	2,305 16
L. C. Hulburd	Senior assistant engineer	3,300 per year	938 09	48 94	986 94
H. L. Bassett	Cashier	1,800 per year	600 00		600 00
W. S. Morris	Estimate clerk	2,100 per year		10 85	10 85
L. J. Mulhauser	Stenographer	1,500 per year	481 27		481 27
G. P. Ketchum	Stenographer	1,000 per year	583 31		583 31
C. W. Costello	Assistant engineer	2,580 per year	1,445 72	86 46	1,532 18
Foster B. Crocker	Assistant engineer	2,580 per year	2,520 00	153 46	2,673 46
Irvin S. Badger	Assistant engineer	2,580 per year	1,845 88	42 46	1,888 34
Lewis Bartlett	Assistant engineer	2,580 per year	2,444 91	233 62	2,678 53
George H. Briggs	Assistant engineer	2,580 per year	1,930 70	42 32	1,973 02
W. J. Durkan	Assistant engineer	2,580 per year	1,538 83	130 81	1,669 64
J. G. Palmer	Assistant engineer	2,580 per year	2,440 00	507 09	2,947 09
Carl L. Bannister	Assistant engineer	2,580 per year	641 36	2 18	643 54
Robert K. Sheldon	Assistant engineer	2,580 per year	134 60	59 51	194 15
Harry H. Brown	Assistant engineer	2,580 per year	422 46	51 48	473 94
David R. Lee	Assistant engineer	2,340 per year	580 85		580 85
R. E. Swinney	Assistant engineer	2,340 per year	1,176 96	26 98	1,203 94
G. S. Haight	Assistant engineer	2,340 per year	2,219 00		2,219 00
D. H. Judson	Assistant engineer	2,208 per year	503 73	50 78	554 51
Solomon Reswick	Assistant engineer	2,208 per year	1,104 79		1,104 79
R. W. Smith	Assistant engineer	2,208 per year	1,104 00	40	1,104 40
J. L. Southworth	Assistant engineer	1,980 per year	1,155 00	1 10	1,156 10
D. J. Levinson	Assistant engineer	1,980 per year	1,208 04	67 30	1,275 34
H. Fell	Assistant engineer	1,980 per year	237 41	45 70	333 12
J. Otis Burt	Assistant engineer	1,980 per year	79 81		79 84
W. S. Saxton	Assistant engineer	1,980 per year	79 84		79 84
Carl F. Hopstein	Junior assistant engineer	1,800 per year	905 21	70 30	975 51
E. L. Keeler	Junior assistant engineer	1,800 per year	1,373 17	52 84	1,423 10
A. J. Crowe, Jr.	Junior assistant engineer	1,680 per year	733 49	22 16	755 65
J. J. Ryan	Junior assistant engineer	1,800 per year	110 41		110 41
G. H. Thomas	Junior assistant engineer	1,800 per year	1,740 65	4 40	1,745 05
Don A. Wilcox	Junior assistant engineer	1,800 per year	1,320 72		1,320 72
N. R. McLoud	Junior assistant engineer	1,800 per year	891 94	184 32	1,076 26
J. J. Gawkins	Junior assistant engineer	1,680 per year	907 74		907 74
C. V. O'Malley	Junior assistant engineer	1,680 per year	850 00	9 32	859 32
E. C. Neudecker	Junior assistant engineer	1,680 per year	980 00	90	980 90
R. W. Austin	Junior assistant engineer	1,680 per year	239 35		239 35
Foster J. Beach	Junior assistant engineer	1,680 per year	1,390 00		1,390 00
M. H. Boigeol	Junior assistant engineer	1,680 per year	1,470 00		1,470 00
H. C. Smith	Junior assistant engineer	1,680 per year	1,520 00		1,520 00
G. L. Stillman	Junior assistant engineer	1,680 per year	1,036 99	75	1,037 74
M. J. Chryst	Junior assistant engineer	1,360 per year	279 57		279 57
J. H. Forth	Junior assistant engineer	1,440 per year	900 00		900 00
H. A. Shafer	Junior assistant engineer	1,440 per year	1,346 13		1,346 13
D. B. Lynch	Junior assistant engineer	1,440 per year	870 00		870 00
J. P. Walsh	Junior assistant engineer	1,440 per year	78 19		78 19
R. E. Homan	Junior assistant engineer	1,320 per year	1,320 00		1,320 00
J. P. Mullin	Junior assistant engineer	1,320 per year	656 45		656 45
W. E. Stahl	Junior assistant engineer	1,200 per year	164 94		164 94
D. E. Robbins	Junior assistant engineer	1,200 per year	58 06		58 06
H. W. Leshensky	Junior assistant engineer	1,200 per year	38 71		38 71
F. S. Corey	Junior assistant engineer	1,200 per year	264 52		264 52
D. D. Rogers	Junior assistant engineer	1,200 per year	306 46		306 46
R. J. Storm	Junior assistant engineer	1,200 per year	730 11		760 11
R. M. R. Howard	Junior assistant engineer	1,110 per year	44 76		44 76
R. J. Storm	Engineering assistant	1,200 per year	108 39		108 39
W. E. Stahl	Engineering assistant	1,200 per year	48 39		48 39
L. A. Kavanagh	Engineering assistant	1,080 per year	1,041 29		1,041 29
F. Lutz	Engineering assistant	1,020 per year	800 78		800 78
E. G. Warner	Engineering assistant	1,020 per year	425 16		425 16
A. W. Bischel	Engineering assistant	960 per year	376 00		376 00
H. F. Hensler	Engineering assistant	960 per year	234 67		234 67
Wm. Crahan	Engineering assistant	930 per year	46 94		46 94
Sol Liebowitz	Engineering assistant	840 per year	50 43		50 43
E. H. Carlson	Engineering assistant	840 per year	51 33		51 33
C. M. Guild	Engineering assistant	840 per year	13 55		13 55
E. H. Hall	Engineering assistant	810 per year	13 55		13 55
M. M. Seidmann	Engineering assistant	840 per year	4 52		4 52

Construction of Barge Canal—Erie Canal—(Continued)

Chapter 117, Laws of 1913, and a remedial law

NAME	Rank	Rate of compensation	Services	Travel	Total
I. H. Steigman	Engineering assistant	\$840 per year	\$4 52		\$4 52
Gail Bowler	Engineering assistant	840 per year	410 96		410 96
E. V. Jones	Engineering assistant	840 per year	83 57		82 57
E. S. Pieri	Engineering assistant	840 per year	467 00		467 00
W. J. Kelly	Inspector of engineering works	1,560 per year	650 00		650 00
W. N. Dutcher	Inspector of engineering works	1,560 per year	130 00		130 00
Frank Ladd	Boatman	3 00 per day	597 00	\$1 10	598 10
W. M. Scanlon	Boatman	3 00 per day	141 00		141 00
G. W. Mann	Boatman	3 00 per day	162 00		162 00
G. E. Barnard	Boatman	3 00 per day	39 00		39 00
A. Preston	Boatman	3 00 per day	237 00		237 00
Clark H. Norton	Laborer	2 50 per day	523 00		523 00
P. Maroney	Laborer	2 50 per day	63 00		63 00
L. G. Hyle	Laborer	2 50 per day	50 00		50 00
G. W. Moulton	Laborer	2 50 per day	30 00		30 00
F. Voorhees	Laborer	2 50 per day	262 50		262 50
F. S. Travers	Laborer	2 50 per day	515 00		515 00
T. D. Clancy	Laborer	2 50 per day	460 00		460 00
F. Brophy	Laborer	2 50 per day	780 00		780 00
A. P. Meyers	Laborer	2 50 per day	460 00		460 00
J. Reh	Laborer	2 50 per day	462 50		462 50
J. J. Cross	Laborer	2 50 per day	480 00		480 00
W. Worden	Laborer	2 50 per day	367 50	1 23	368 73
W. T. Tanner, Jr.	Laborer	2 50 per day	782 50		782 50
G. W. Wilson	Laborer	2 50 per day	752 50		752 50
W. C. Ralston	Laborer	2 50 per day	77 50	1 83	79 33
H. Higgins	Laborer	2 50 per day	257 50		257 50
J. Merideth	Laborer	2 50 per day	275 00		275 00
C. P. Plummer	Laborer	2 50 per day	205 00		205 00
W. Bird	Laborer	2 50 per day	250 00		250 00
C. W. Chase	Chauffeur	1,500 per year	575 00	47 25	622 25
J. Connors	Janitor	1,200 per year	50 00		50 00
C. H. Osterhout	Fireman	800 per year	37 50		37 50
Geo. Ebeling	Gage reader	10 per month	90 00		90 00
Dan Burhans	Gage reader	10 per month	30 00		30 00
J. R. Bixby	Gage reader	7 per month	84 00		84 00
Daniel Brown	Gage reader	7 per month	21 00		21 00
Marie Brandt Brown	Gage reader	7 per month	84 00		84 00
A. H. Hoffmeister	Gage reader	7 per month	84 00		84 00
A. H. Lefebvre	Gage reader	7 per month	70 00		70 00
H. L. Ropes	Gage reader	7 per month	14 00		14 00
Ida C. Powell	Gage reader	7 per month	84 00		84 00
W. S. Siver	Gage reader	7 per month	84 00		84 00
John Phillips	Gage reader	6 per month	72 00		72 00
W. H. Dunn	Gage reader	5 per month	60 00		60 00
Mrs. M. Hannon	Gage reader	4 per month	4 00		4 00
H. W. Hoch	Gage reader	5 per month	55 00		55 00
Mrs. J. R. Hiller	Gage reader	7 per month	84 00		84 00
Fred Chamberlain	Gage reader	5 per month	60 00		60 00
A. R. Yates	Gage reader	5 per month	60 00		60 00
M. Kennedy	Gage reader	5 per month	15 00		15 00
A. R. Merrett	Gage reader	5 per month	65 00		65 00
L. Sitterly	Gage reader	7 per month	84 00		84 00
F. Shane	Gage reader	5 per month	31 00		30 00
M. A. Smith	Gage reader	5 per month	32 10		32 10
Wm. Prettie	Gage reader	10 per month	120 00		120 00
Wm. H. Burns	Gage reader	5 per month	60 00		60 00
M. Quimby	Gage reader	5 per month	60 00		60 00
H. D. Schmidt	Livery			409 90	409 90
G. E. Wright	Livery			400 00	400 00
L. A. Withey	Livery			175 00	175 00
W. J. Helfert	Livery			584 00	584 00
E. A. Thomas	Livery			270 00	270 00
Starwix Hall Livery	Livery			422 00	422 00
C. L. Hickland	Livery			234 00	234 00
Neil Havens	Livery			982 00	982 00
M. K. Ryan	Livery			6 00	6 00
E. C. Rogers	Livery			318 50	318 50
M. J. Colvin	Livery			317 00	317 00
		\$68,850 58	\$6,444 23	\$75,294 81	

Construction of Barge Canal—Erie Canal—(Concluded)

Chapter 117, Laws of 1903, and a remedial law

NAME	Rank	Rate of compensation	Services	Travel	Total
<i>Incidental Expenses</i>					
Instruments and tools.....				\$75 00	
Stationery and printing.....				46 55	
Office rent.....				735 00	
Fuel and light.....				812 87	
Postage.....				167 07	
Telephone and telegraph.....				463 90	
Miscellaneous.....				2,515 41	
Total.....					4,866 70
Total.....					\$80,161 51

Construction of Barge Canal—Oswego Canal

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
Guy Moulton.....	Division engineer.....	\$4,800 per year	\$930 00	\$56 92	\$956 92
E. J. Berry.....	Senior assistant engineer.....	3,300 per year	169 14	3 25	172 49
L. C. Hulburd.....	Senior assistant engineer.....	3,000 per year	759 00	41 55	800 55
Harvey Wagner.....	Stenographer.....	1,500 per year	1,000 00		1,000 00
L. J. Mulhauser.....	Stenographer.....	1,500 per year	345 83		345 83
E. M. Ellis.....	Assistant engineer.....	2,580 per year	1,695 15	589 82	2,283 97
G. H. Haley.....	Assistant engineer.....	2,580 per year	723 24	161 46	884 90
I. S. Badger.....	Assistant engineer.....	2,580 per year	76 29	2 38	78 67
W. J. Durkan.....	Assistant engineer.....	2,340 per year	69 19		69 19
Carl L. Bannister.....	Assistant engineer.....	2,340 per year	44 03		44 03
P. H. Budd.....	Assistant engineer.....	2,340 per year	59 35	65 81	125 16
W. S. Faxton.....	Assistant engineer.....	2,160 per year	1,915 16		1,915 16
N. R. McLoud.....	Junior assistant engineer.....	1,800 per year	908 06	155 28	1,063 34
Carl F. Hopstein.....	Junior assistant engineer.....	1,800 per year	68 87	24 06	92 93
M. H. Boigeol.....	Junior assistant engineer.....	1,800 per year	150 00		150 00
E. L. Keeler.....	Junior assistant engineer.....	1,800 per year	48 39		48 39
A. J. Crowe, Jr.....	Junior assistant engineer.....	1,680 per year	466 18		466 18
C. L. Fox.....	Junior assistant engineer.....	1,680 per year	356 42		356 42
D. E. Robbins.....	Junior assistant engineer.....	1,440 per year	505 94		505 94
A. T. Brown.....	Junior assistant engineer.....	1,440 per year	712 58		712 58
H. L. DuBois.....	Junior assistant engineer.....	1,320 per year	31 94		31 94
R. J. Storm.....	Junior assistant engineer.....	1,200 per year	100 00		100 00
H. W. Leshensky.....	Junior assistant engineer.....	1,200 per year	33 33		33 33
W. J. Bell.....	Junior assistant engineer.....	1,200 per year	92 26		92 26
Wm. Crahan.....	Engineering assistant.....	1,020 per year	781 77		781 77
Gail Bowler.....	Engineering assistant.....	840 per year	70 00		70 00
R. J. Storm.....	Engineering assistant.....	1,200 per year	100 00		100 00
W. N. Dutcher.....	Engineering assistant.....			9 49	9 49
Geo. E. Barnard.....	Boatman.....	3 00 per day	432 00		432 00
Thomas Moran.....	Boatman.....	3 00 per day	135 00		135 00
Chas. Smith.....	Laborer.....	2 50 per day	442 50		442 50
Jno. Dygert.....	Laborer.....	2 50 per day	460 00		460 00
Patrick Hickey.....	Laborer.....	2 50 per day	100 00		100 00
Wm. McKinstry.....	Laborer.....	2 50 per day	7 50		7 50
Clark H. Norton.....	Laborer.....	2 50 per day	125 00		125 00
Leon Hollenbeck.....	Gage reader.....	5 00 per month	60 00		60 00
D. D. Tompkins.....	Gage reader.....	5 00 per month	60 00		60 00
B. M. Wilcox.....	Gage reader.....	5 00 per month	60 00		60 00
John Connor.....	Janitor.....	1,200 per year	150 00		150 00
Chas. W. Chase.....	Chauffeur.....	1,500 per year		9 15	9 15
Margaret Sheridan.....	Telephone operator.....	720 per year	90 00		90 00
Charles H. Osterhout.....	Fireman.....	900 per year	37 50		37 50
			\$14,341 62	\$1,118 47	\$15,460 09

Construction of Barge Canal—Oswego Canal—(Continued)

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
<i>Incidental Expenses</i>					
Stationery and printing.....				\$11 50	
Fuel and light.....				63 63	
Postage.....				78 70	
Telephone and tel graph.....				270 34	
Miscellaneous.....				403 30	
					827 47
Total.....					\$16,287 56

Construction of Barge Canal—Cayuga and Seneca Canal

Chapter 391, Laws of 1909, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
Guy Moulton.....	Division engineer.....	\$4,800 per year	\$900 00	\$32 32	\$932 32
H. C. Smith.....	Senior assistant engineer.....	2,820 per year	2,193 36	217 77	2,411 13
J. S. Popper.....	Caisson engineer.....	2,400 per year	595 06	3 46	598 52
Henry Goldmark.....	Consulting engineer.....	60 00 per day	240 00	56 09	296 09
E. E. Haskell.....	Consulting engineer.....	60 00 per day	180 00	13 62	193 62
H. C. Allen.....	Consulting engineer.....	60 00 per day	360 00	5 16	365 16
E. C. Moore.....	Consulting engineer.....	60 00 per day	180 00	20 97	200 97
Joseph Ripley.....	Consulting eng neer.....	600 00 per month	96 77	27 40	124 17
I. S. Badger.....	Assistant engineer.....	2,340 per year	390 00	2 10	392 10
Carl L. Bannister.....	Assistant engineer.....	2,340 per year	1,036 61	2 48	1,039 09
R. W. Smith.....	Assistant engineer.....	2,208 per year	184 00		184 00
L. L. Hadley.....	Assistant engineer.....	2,340 per year	1,651 57	103 23	1,754 80
C. H. Swick.....	Assistant engineer.....	2,208 per year	374 13	4 55	378 68
H. N. Metzger.....	Assistant engineer.....	2,208 per year	47 48	24 51	71 99
M. L. Babcock.....	Junior assistant engineer.....	1,800 per year	1,491 94		1,491 94
L. W. Bentley.....	Junior assistant engineer.....	1,800 per year	1,290 00		1,290 00
E. L. Keeler.....	Junior assistant engineer.....	1,680 per year	134 53	27 68	162 21
Carl F. Hopstein.....	Junior assistant engineer.....	1,800 per year	24 19	36 87	61 06
H. L. Drake.....	Junior assistant engineer.....	1,560 per year	1,170 00		1,170 00
R. S. Mack.....	Junior assistant engineer.....	1,440 per year	1,098 00		1,098 00
J. H. Forth.....	Junior assistant engineer.....	1,200 per year	100 00		100 00
J. R. Tighe.....	Junior assistant engineer.....	1,200 per year	3 55	3 11	6 66
R. S. Pollard.....	Engineering assistant.....	840 per year	359 03		359 03
E. F. Allen.....	Laborer.....	2 50 per day	717 50		717 50
Wm. Philo.....	Laborer.....	2 50 per day	780 00		780 00
Jos. Dyson.....	Laborer.....	2 50 per day	495 00		495 00
W. E. Lerch.....	Laborer.....	2 50 per day	330 00		330 00
Jas. Thorne.....	Laborer.....	2 50 per day	462 50		462 50
R. H. Brown.....	Laborer.....	2 50 per day	45 00		45 00
T. C. McNicholas.....	Gage reader.....	7 00 per month	84 00		84 00
C. N. Bacon.....	Gage reader.....	5 00 per month	60 00		60 00
E. F. Garbus.....	Gage reader.....	5 00 per month	60 00		60 00
W. H. Lane.....	Gage reader.....	5 00 per month	60 00		60 00
C. D. Martin.....	Gage reader.....	5 00 per month	60 00		60 00
Timothy Regan.....	Gage reader.....	5 00 per month	60 00		60 00
Fred Wright.....	Gage reader.....	5 00 per month	60 00		60 00
Margaret Sheridan.....	Telephone operator.....	30 00 per month	85 00		85 00
C. W. Chase.....	Chauffeur.....	1,500 per year	115 00	14 20	129 20
Henry L. Bassett.....	Cashier.....	1,800 per year	150 00		150 00
John Connor.....	Janitor.....	600 00 per year	100 00		100 00
B. C. Smith.....	Livery.....			36 00	36 00
D. M. Kellogg.....	Livery.....			106 00	106 00
			\$17,824 22	\$737 52	\$18,561 74
<i>Incidental Expenses</i>					
Instruments and tools.....				\$12 00	
Office rent.....				330 48	
Stationery and printing.....				18 89	
Fuel and light.....				12 32	
Postage.....				23 70	
Telephone and telegraph.....				188 26	
Miscellaneous.....				351 56	
					937 21
Total.....					\$19,498 95

Construction of Barge Canal Terminals

Chapter 746, Laws of 1911, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
Guy Moulton	Division engineer	\$4,800 per year	\$900 00	\$2 95	\$902 95
L. C. Hulburd	Senior assistant engineer	3,060 per year	910 50	32 41	942 91
W. S. Morris	Estimate clerk	2,100 per year	300 00		300 00
L. J. Mulhauser	Stenographer	1,500 per year	577 28		577 28
H. L. Bassett	Cashier	1,800 per year	450 00		450 00
A. G. Card	Assistant engineer	2,580 per year	2,440 00	8 10	2,448 10
W. J. Durkan	Assistant engineer	2,580 per year	586 68	17 75	604 43
George H. Haley	Assistant engineer	2,580 per year	1,834 66	37 78	1,872 44
Lewis Bartlett	Assistant engineer	2,580 per year	169 45	2 20	171 65
Carl L. Bannister	Assistant engineer	2,580 per year	195 00		195 00
R. E. Swinney	Assistant engineer	2,340 per year	195 00		195 00
Roy Enzell	Junior assistant engineer	1,320 per year	330 00		330 00
Don A. Wilcox	Junior assistant engineer	1,680 per year	165 95		165 95
J. S. Bierhardt	Junior assistant engineer	1,440 per year	53 23		53 23
E. L. Keeler	Junior assistant engineer	1,800 per year	9 33	3 52	12 85
G. L. Stillman	Junior assistant engineer	1,560 per year	172 36		172 36
L. J. Storm	Junior assistant engineer	1,200 per year	75 38		75 38
A. J. Crowe, Jr.	Junior assistant engineer	1,680 per year	4 33	1 35	5 68
L. H. Coit	Junior assistant engineer	1,560 per year	988 93		988 93
J. P. Mullen	Junior assistant engineer	1,320 per year	110 00		110 00
Carl F. Hopstein	Junior assistant engineer	1,800 per year		18 84	18 84
W. J. Bell	Junior assistant engineer	1,200 per year	1,107 74		1,107 74
J. E. Smith	Junior assistant engineer	1,800 per year	929 03		929 03
C. L. Fox	Junior assistant engineer	1,560 per year	893 07		893 07
H. A. Shafer	Junior assistant engineer	1,440 per year	23 87		23 87
J. P. Walsh	Junior assistant engineer	1,440 per year	42 58		42 58
Daniel Scanlon	Engineering assistant	1,020 per year	485 89		485 89
A. Moosbrugger	Engineering assistant	1,080 per year	1,045 00		1,045 00
R. J. Storm	Engineering assistant	1,200 per year	40 00		40 00
E. G. Warner	Engineering assistant	860 per year	40 00		40 02
F. Lutz	Engineering assistant	1,020 per year	204 22		204 20
L. A. Kavanagh	Engineering assistant	1,080 per year	23 71		23 71
W. N. Dutcher	Inspector of engineering works	1,560 per year	780 00		780 00
Patrick Ryan	Boatman	3 00 per day	951 00		951 00
Frank Ladd	Boatman	3 00 per day	345 00		345 00
Thomas Moran	Boatman	3 00 per day	474 00		474 00
R. D. Smith	Laborer	2 50 per day	782 50		782 50
Wm. McKinstry	Laborer	2 50 per day	397 50		397 50
Patrick Hickey	Laborer	2 50 per day	292 50		292 50
Chas. W. Chase	Chauffeur	1,500 per year	230 00	3 65	233 65
Margaret Sheridan	Telephone operator	600 per year	60 00		60 00
John Connor	Janitor	1,200 per year	100 00		100 00
Chas. W. Osterhout	Fireman	900 per year	94 36		94 36 0)
			\$19,810 05	\$128 55	\$19,938 60
<i>Incidental Expenses</i>					
Office rent				\$5 00	
Fuel and light				100 40	
Stationery and printing				43 50	
Postage				77 85	
Telephone and telegraph				190 40	
Express and freight				4 61	
Miscellaneous				1,004 29	
					1,426 05
Total					\$21,364 65

Yorkville Bridge

Chapter 752, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
E. J. Berry.....	Senior assistant engineer.....	\$3,300 per year	\$58 68	\$10 63	\$69 31
D. R. L. e.....	Assistant engineer.....	2,340 per year	102 04	8 60	170 04
C. F. Hopstein.....	Junior assistant engineer.....	1,830 per year	19 33	7 39	26 65
E. L. Koeler.....	Junior assistant engineer.....	1,830 per year	12 55	.....	13 55
D. D. Rogers.....	Junior assistant engineer.....	1,200 per year	30 00	.....	30 00
Total.....	.....	.....	\$383 62	\$25 93	\$309 55

Whitesboro Street Bridge, Rome

Chapter 753, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
E. J. Berry.....	Senior assistant engineer.....	.....	.....	\$2 31	\$2 31
<i>Incidental Expenses</i>					
Stationery and printing.....	.....	.....	.....	.....	\$56 44
Total.....	.....	.....	.....	.....	\$60 75

Lyons Falls Bridge

Chapter 246, Laws of 1913; chapters 699 and 728, Laws of 1915

NAME	Rank	Rate of compensation	Services	Travel	Total
D. R. Lee.....	Assistant engineer.....	\$2,340 per year	\$274 81	\$12 42	\$287 23
J. H. Forth.....	Junior assistant engineer.....	1,440 per year	100 00	.....	100 00
W. S. Morris.....	Estimate clerk.....	.....	.....	5 05	5 05
<i>Incidental Expenses</i>			\$374 81	\$17 47	\$392 28
Postage.....	.....	.....	.....	\$4 01	.....
Miscellaneous.....	2 67	6 63
Total.....	\$398 96

MIDDLE DIVISION: ENGINEERING EXPENSES

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Cowaselon Creek Improvement

Chapter 781, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
D. H. Judson.....	Assistant engineer.....	\$2,340 per year	\$276 99	\$212 39	\$489 29
M. J. Chryst.....	Junior assistant engineer.....	1,560 per year	195 70		195 70
J. T. Doris.....	Junior assistant engineer.....	1,200 per year	83 87		83 87
D. D. Rogers.....	Junior assistant engineer.....	1,200 per year	16 13		16 13
E. H. Carlson.....	Engineering assistant.....	840 per year	58 71		58 71
L. G. Hyle.....	Laborer.....	2 50 per day	32 50		32 50
<i>Incidental Expenses</i>			\$863 90	\$212 30	\$663 90
Livery.....				\$92 00	
Miscellaneous.....				12 65	
Total.....					\$980 85

Limestone Creek Improvement

Chapter 751, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
E. J. Barry.....	Senior assistant engineer.....	\$3,200 per year	\$25 50	\$1 00	\$38 50
D. H. Judson.....	Assistant engineer.....	2,340 per year	77 16	3 00	80 76
C. F. Hopsteln.....	Junior assistant engineer.....	1,200 per year	29 03		29 03
E. L. Keeler.....	Junior assistant engineer.....	1,200 per year	9 03		9 03
D. D. Rogers.....	Junior assistant engineer.....	1,200 per year	29 89	2 10	31 99
S. Kiebowitz.....	Engineering assistant.....	840 per year	2 25		2 25
L. G. Hyle.....	Laborer.....	2 50 per day	2 50		2 50
Total.....			\$175 36	\$6 70	\$182 06

Minetto Bridge

Chapter 716, Laws of 1915

NAME	Rank	Rate of compensation	Services	Travel	Total
E. M. Ellis.....	Assistant engineer.....	\$2,580 per year	\$696 95	\$6 50	\$633 51
A. T. Brown.....	Junior assistant engineer.....	1,320 per year	177 42		177 42
C. L. Fox.....	Junior assistant engineer.....	1,560 per year	320 51		320 51
Chas. Smith.....	Laborer.....	2 50 per day	340 00		341 00
<i>Incidental Expenses</i>			\$1,464 83	\$6 56	\$1,471 44
Livery.....				\$3 00	
Fuel and light.....				1 13	
Telephone and telegraph.....				22 63	
Postage.....				2 24	
Miscellaneous.....				32 02	
Total.....					\$1,522 43

Canandaigua Lake Dredging

Chapter 756, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
E. J. Berry.....	Senior assistant engineer.....	\$3,300 per year	\$8 50	\$12 77	\$21 27
D. H. Judson.....	Assistant engineer.....	2,840 per year	41 55	16 72	58 27
C. F. Hopstein.....	Junior assistant engineer.....	1,900 per year	33 87		33 87
J. P. Walsh.....	Junior assistant engineer.....	1,440 per year	4 00	8 32	12 32
C. P. Plummer.....	Laborer.....	2 50 per day	2 50		2 50
			\$90 42	\$37 81	\$128 23
<i>Incidental Expenses</i>					
Stationery and printing.....				\$23 60	
Miscellaneous.....				57	
					24 17
Total.....					\$152 40

Blue Line Surveys—Erie Canal

Chapter 646, Laws of 1916; chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
E. J. Berry.....	Senior assistant engineer.....	\$3,300 per year	\$787 08	\$30 59	\$817 67
R. K. Sheldon.....	Senior assistant engineer.....	2,580 per year	1,096 60	255 60	1,352 20
C. W. Costello.....	Senior assistant engineer.....	2,580 per year	735 97	2 10	738 07
D. R. Lee.....	Senior assistant engineer.....	2,340 per year	584 05		584 05
Harold Bills.....	Senior assistant engineer.....	1,980 per year	814 35	148 06	963 41
J. Otis Burt.....	Senior assistant engineer.....	1,980 per year	819 68	249 91	1,069 59
J. J. Ryan.....	Junior assistant engineer.....	1,800 per year	840 00		840 00
J. P. Walsh.....	Junior assistant engineer.....	1,440 per year	826 13		826 13
O. M. Peavy.....	Junior assistant engineer.....	1,200 per year	360 00		360 00
H. R. Horton.....	Junior assistant engineer.....	1,200 per year	306 45		306 45
D. D. Rogers.....	Junior assistant engineer.....	1,200 per year	149 78		149 78
H. W. Leashensky.....	Junior assistant engineer.....	1,200 per year	305 38		305 38
E. V. Jones.....	Engineering assistant.....	840 per year	255 84		255 84
R. R. Stevens.....	Engineering assistant.....	840 per year	121 33		121 33
S. Wolf.....	Engineering assistant.....	840 per year	83 55		83 55
J. T. Doris.....	Engineering assistant.....	840 per year	50 00		50 00
S. Liebowitz.....	Engineering assistant.....	840 per year	109 90		109 90
H. F. Kinney.....	Engineering assistant.....	840 per year	265 55		265 55
E. H. Carlson.....	Engineering assistant.....	840 per year	100 33		100 33
E. D. Pieri.....	Engineering assistant.....	840 per year	107 26		107 26
C. M. Guild.....	Engineering assistant.....	840 per year	105 00		105 00
E. H. Hall.....	Engineering assistant.....	840 per year	105 00		105 00
I. N. Steigman.....	Engineering assistant.....	840 per year	40 65		40 65
M. M. Seidman.....	Engineering assistant.....	840 per year	215 87		215 87
Gail Bowler.....	Engineering assistant.....	840 per year	149 33		149 33
C. P. Plummer.....	Laborer.....	2 50 per day	267 50		267 50
G. W. Moulton.....	Laborer.....	2 50 per day	27 50		27 50
L. G. Hyde.....	Laborer.....	2 50 per day	40 00		40 00
			\$9,670 08	\$686 26	\$10,356 34
<i>Incidental Expenses</i>					
Livery.....				\$763 00	
Postage.....				52 54	
Telephone and telegraph.....				1 05	
Miscellaneous.....				639 90	
					1,456 49
Total.....					\$11,812 83

Blue Line Surveys — Oswego Canal

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
E. J. Berry	Senior assistant engineer	\$3,300 per year	\$32 90		\$32 90
R. K. Sheldon	Senior assistant engineer	2,580 per year	488 23	\$79 00	567 23
C. W. Costello	Senior assistant engineer	2,580 per year	100 64		100 64
D. R. Lee	Senior assistant engineer	2,340 per year	100 90		100 90
J. J. Ryan	Junior assistant engineer	1,800 per year	352 26		352 26
J. P. Walsh	Junior assistant engineer	1,440 per year	133 55		133 55
E. V. Jones	Engineering assistant	840 per year	6 77		6 77
Gail Bowler	Engineering assistant	840 per year	9 04		9 04
E. D. Pieri	Engineering assistant	840 per year	11 29		11 29
C. P. Plummer	Laborer	2 50 per day	152 50		152 50
G. W. Moulton	Laborer	2 50 per day	32 50		32 50
<i>Incidental Expenses</i>			\$1,420 58	\$79 00	\$1,499 58
Livery				\$15 00	
Miscellaneous				60	
					15 60
Total					\$1,515 18

Surveys for State Court of Claims — Erie Canal

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
E. J. Berry	Senior assistant engineer	\$3,300 per year	\$442 24	\$22 33	\$464 57
R. K. Sheldon	Senior assistant engineer	2,580 per year	35 84	5 25	41 09
D. H. Judson	Senior assistant engineer	2,208 per year	286 88	29 02	315 90
G. H. Thomas	Junior assistant engineer	1,800 per year	29 35	4 74	34 09
C. F. Hopstein	Junior assistant engineer	1,800 per year	249 94	18 96	268 90
J. J. Ryan	Junior assistant engineer	1,800 per year	25 00		25 00
J. T. Doris	Junior assistant engineer	1,200 per year	22 58		22 58
M. J. Chryst	Junior assistant engineer	1,560 per year	181 72		181 72
O. M. Peavy	Junior assistant engineer	1,200 per year	3 22		3 22
E. H. Carlson	Engineering assistant	840 per year	44 19		44 19
E. D. Pieri	Engineering assistant	840 per year	11 66		11 66
S. Liebowitz	Engineering assistant	840 per year	9 19		9 19
M. M. Seidman	Engineering assistant	840 per year	29 35		29 35
L. E. Jenkins	Laborer	2 50 per day	32 50		32 50
<i>Incidental Expenses</i>			\$1,403 66	\$80 30	\$1,483 96
Livery				\$78 00	
Postage				14 50	
Miscellaneous				11 25	
					103 75
Total					\$1,587 71

Surveys for State Court of Claims—Black River Canal

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
E. J. Berry.....	Senior assistant engineer.....	\$3,300 per year	\$33 18	\$2 76	\$35 94
R. K. Sheldon.....	Senior assistant engineer.....	2,560 per year	14 33	16 75	31 08
D. H. Judson.....	Senior assistant engineer.....	2,208 per year	42 34	68 07	110 41
C. F. Hopstein.....	Junior assistant engineer.....	1,800 per year	34 52	.....	34 52
J. J. Ryan.....	Junior assistant engineer.....	1,800 per year	10 00	.....	10 00
M. J. Chryst.....	Junior assistant engineer.....	1,560 per year	29 91	.....	29 91
M. M. Seidman.....	Engineering assistant.....	840 per year	6 78	.....	6 78
H. V. Jones.....	Engineering assistant.....	840 per year	9 33	.....	9 33
E. D. Pieri.....	Engineering assistant.....	840 per year	4 67	.....	4 67
<i>Incidental Expenses</i>			\$185 66	\$87 58	\$272 64
Livery.....				\$28 00	
Miscellaneous.....				37	
Total.....					\$301 01

Survey for Barge Canal Extension to Auburn

Chapter 376, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
H. C. Smith.....	Senior assistant engineer.....	\$2,820 per year	\$626 64	\$29 81	\$656 45
H. H. Brown.....	Assistant engineer.....	2,580 per year	1,909 54	181 96	2,042 50
L. L. Hadley.....	Assistant engineer.....	2,280 per year	587 43	.....	587 43
G. L. Stillman.....	Junior assistant engineer.....	1,560 per year	380 63	.....	380 63
C. V. O'Malley.....	Junior assistant engineer.....	1,680 per year	348 77	.....	348 77
J. S. Bierhardt.....	Junior assistant engineer.....	1,440 per year	1,041 77	.....	1,041 77
H. L. DuBois.....	Junior assistant engineer.....	1,440 per year	1,042 06	.....	1,042 06
F. S. Corey.....	Junior assistant engineer.....	1,200 per year	799 35	.....	799 35
R. M. R. Howard.....	Junior assistant engineer.....	1,110 per year	399 24	.....	399 24
F. Maroney.....	Engineering assistant.....	840 per year	220 98	.....	220 98
T. M. Strohmenger.....	Engineering assistant.....	840 per year	178 91	.....	178 91
C. W. Higgins.....	Laborer.....	2 50 per day	120 03	.....	120 00
T. M. Strohmenger.....	Laborer.....	2 50 per day	102 50	.....	102 50
F. Maroney.....	Laborer.....	2 50 per day	67 50	.....	67 50
<i>Incidental Expenses</i>			\$7,737 34	\$211 77	\$7,949 11
Stationery and printing.....				\$0 40	
Office rent.....				52 50	
Fuel and light.....				37 93	
Livery.....				93 00	
Postage.....				4 34	
Telephone and telegraph.....				80	
Miscellaneous.....				221 33	
Total.....					\$8,359 21

SUMMARY

The foregoing tables are summarized as follows:

Ordinary Repairs to Canals

1. Erie canal, chapter 181, Laws of 1917.....	\$9,633 69
2. Black River canal, chapter 181, Laws of 1917.....	331 19

Construction of Barge Canal

3. Erie canal, chapter 147, Laws of 1903, and amendatory laws.....	80,161 51
4. Oswego canal, chapter 147, Laws of 1903, and amendatory laws.....	16,287 56
5. Cayuga and Seneca canal, chapter 391, Laws of 1909, and amendatory laws..	19,498 95

Construction of Barge Canal Terminals

6. Barge canal terminals, chapter 746, Laws of 1911, and amendatory laws.....	21,364 65
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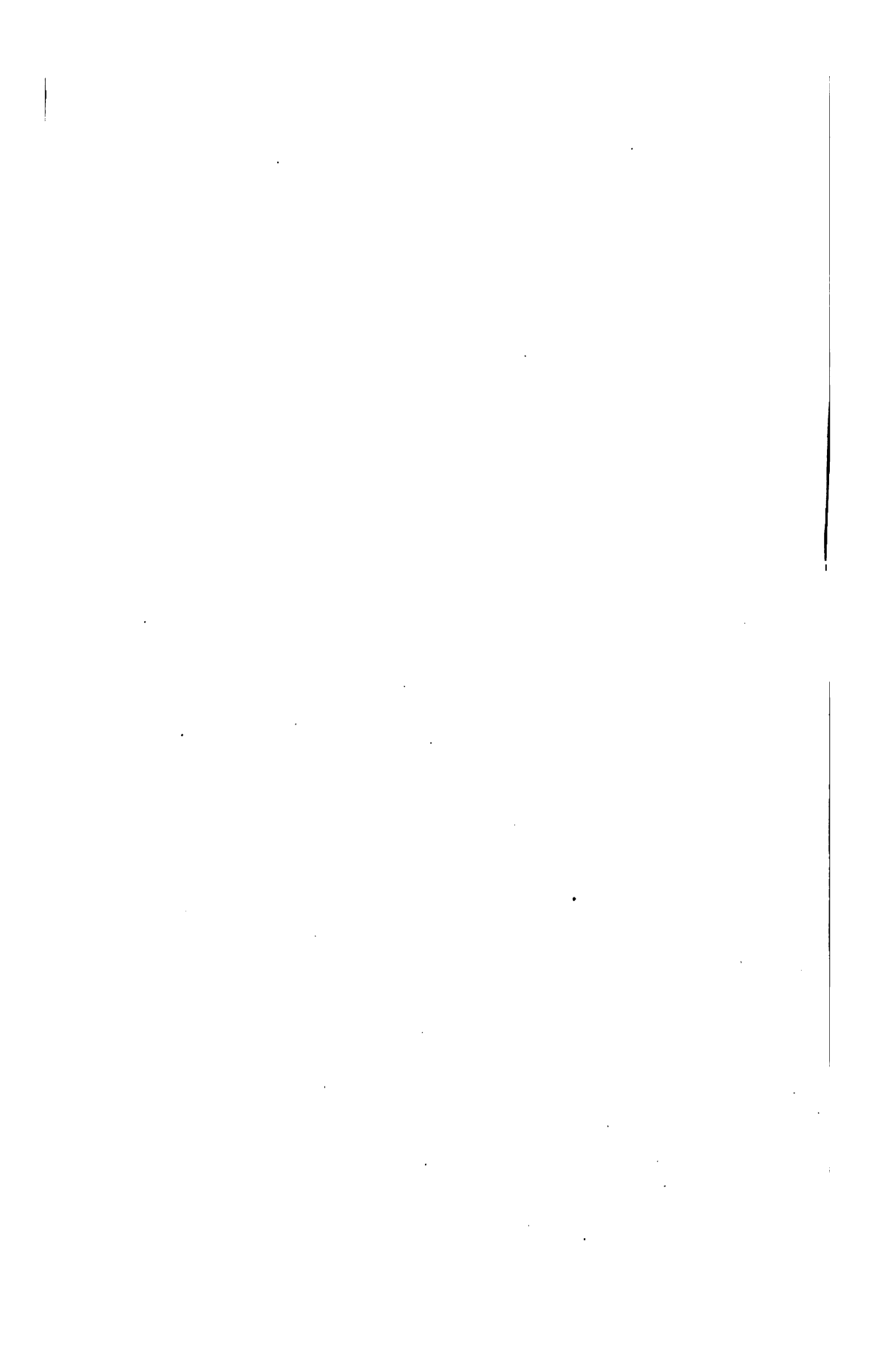
Special Work

7. Yorkville bridge, chapter 752, Laws of 1917.....	309 55
8. Whitesboro street bridge, Rome, chapter 753, Laws of 1917.....	60 75
9. Lyons Falls bridge, chapter 246, Laws of 1913; chapters 699 and 728, Laws of 1915.....	398 96
10. Cowaselon creek improvement, chapter 781, Laws of 1917.....	980 85
11. Limestone creek improvement, chapter 751, Laws of 1917.....	182 06
12. Minetto bridge, chapter 716, Laws of 1915.....	1,532 48
13. Canandaigua lake dredging, chapter 756, Laws of 1917.....	152 40

Special Surveys

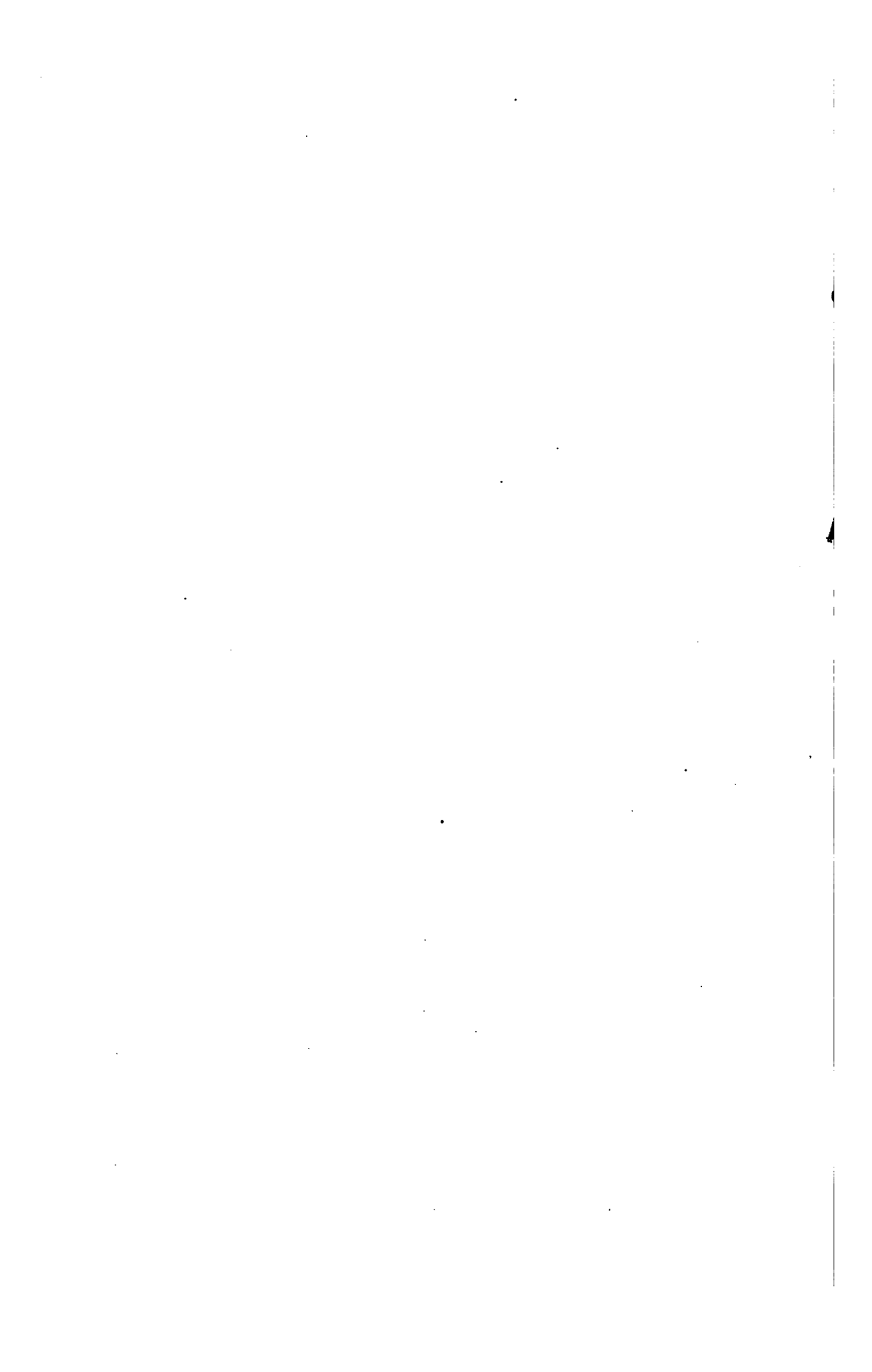
14. Blue line surveys, Erie canal, chapter 646, Laws of 1916; chapter 181, Laws of 1917.....	11,812 83
15. Blue line surveys, Oswego canal, chapter 181, Laws of 1917.....	1,515 18
16. Surveys for State Court of Claims, Erie canal, chapter 181, Laws of 1917.....	1,587 71
17. Surveys for State Court of Claims, Black River canal, chapter 181, Laws of 1917.....	301 01
18. Survey for Barge canal extension to Auburn, chapter 376, Laws of 1917.....	8,359 21

Total.....	\$174,470 54
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REPORT
OF THE
DIVISION ENGINEER
OF THE
WESTERN DIVISION

For the Fiscal Year Ended June 30, 1918



WESTERN DIVISION

STATE OF NEW YORK
DEPARTMENT OF STATE ENGINEER AND SURVEYOR
WESTERN DIVISION

ROCHESTER, N. Y., July 1, 1918.

HON. FRANK M. WILLIAMS, *State Engineer and Surveyor, Albany,*
N. Y.:

Sir.— I have the honor of submitting herewith my report for the fiscal year ended June 30, 1918, as Division Engineer of the Western Division.

BARGE CANAL CONSTRUCTION

The principal work of the year has been directed towards one important objective, namely, the opening of the Barge canal system in its enlarged dimensions for the season of 1918, and it is a matter for congratulation that in spite of obstacles which seemed at one time almost insuperable this object was accomplished, and on May 15 the Western Division, where the last heavy work remained to be done, was officially opened for Barge canal navigation simultaneously with the opening of the entire system throughout the state.

Just prior to this event, on the tenth of May, the State Engineer and the Special Deputy State Engineer, together with a small group composed of members of the engineering staff and a few prominent citizens, assembled in Genesee Valley park, Rochester, where the ceremony of removing the last shovelful of earth, which prevented the waters of the Genesee river from entering the canal and which constituted the last barrier to navigation, was performed by the State Engineer himself to the accompaniment of numerous whistles and some little celebration in acknowledgment of the importance of the event.

On the evening of the fifteenth the engineers and contractors of this Division to the number of nearly a hundred gathered at the Hotel Rochester to celebrate the event of the day and the year. As toastmaster I had the pleasure of thanking the men from the Division, who had creditably performed their services.

As the event of the evening I was privileged to introduce the guest of honor, the State Engineer, and at the same time to present to him the shovel (altered in appearance by varnish and nickel-plating) with which he had opened the last link in the canal a few days before. As I consider it is to his efforts more than to those of anyone else that the successful outcome of our work should be ascribed, I believe it is not inappropriate for me to emphasize the State Engineer's remarks, and I therefore quote the following paragraphs from the record which appeared in the newspapers the next morning:

"Probably there is no man in the city of Rochester tonight outside of this room — mark the exception — who has greater cause for gratification than I. At a time when it is almost providential in its occurrence the Department of the State Engineer has been able to throw open to public use a route of transportation in that part of the country where it is most needed.

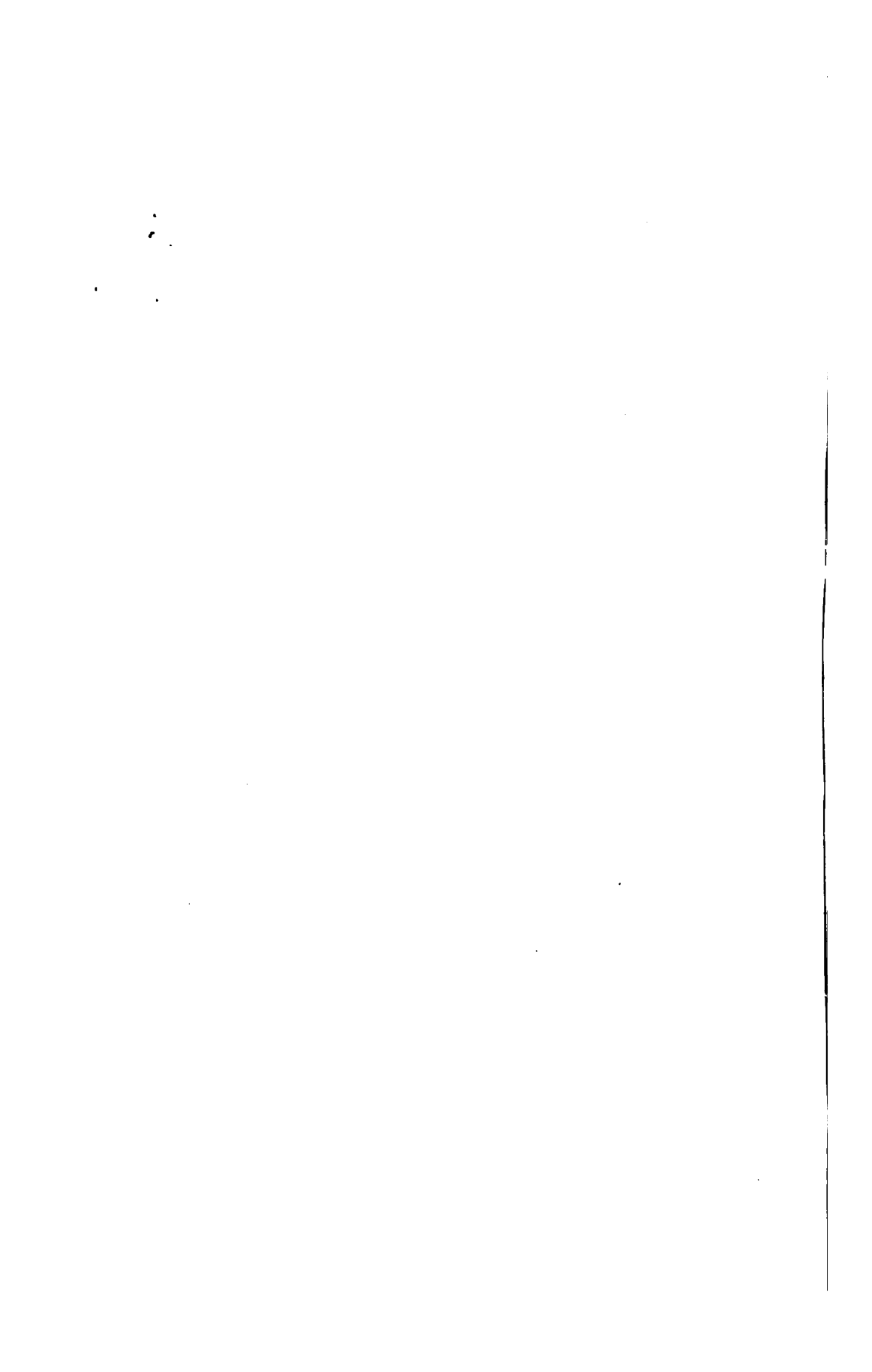
"The war has been in progress a little more than one year, so far as our participation in it is concerned. We are told that food will win the war, that money will win the war, that men will win the war, and each of these is a factor without which we cannot win, but underlying everything else as a prime necessity is transportation.

"Every true-hearted American is anxious to do his part in making certain that 'liberty shall not perish from off the earth,' but this duty is not entirely taken up with the handling of bayonets and bombs and airplanes and artillery. You men who have strained your nerves and worked your hardest to get this canal open, so that it might carry the necessities of war, have rendered to your country a service whose effect on the decision to be reached in Europe may outweigh the work of an entire army corps. Let not one of you regard lightly what he has done or the part he has played. Engineers and contractors alike, you have served the great cause perhaps better than you know.



REMOVAL OF DIKE ON THE EAST BANK OF THE GENESEE RIVER

The State Engineer opened this dike by digging a ditch through it. An excavator completed the removal. A half hour later a similar performance on the west bank opened a thorough channel across the state.



"I do not know what caused this war — commercial ambition, lack of territory, what not — but I do know that what we have completed today will most certainly be a factor in speeding the war's conclusion, and that after a victorious peace the canal will take the place it was originally designed to occupy — a successful and economical means for peaceful transportation of the products of the industry of the people of the great commercial state of New York."

On this occasion, as well as at other times, whenever the opportunity has offered, attention was called to the roster of men who have entered the military service of the country since the declaration of war. The photographs of a number of them in uniform were thrown upon the screen and the "Honor Roll," which usually occupies a conspicuous position in the Western Division office, was placed above the toastmaster's seat and decorated with flags and bunting. The names are as follows (September 1, 1918):

O. L. Burdett	S. E. Whitney	Walter R. Miller
C. E. Heydt	J. F. Egan	Elmer R. Stoll
B. S. Davenport	T. L. Curtin	W. R. Lysett
G. H. Yerkes	E. E. R. Dornbach	William F. Burke
Powell Wall	F. S. Barclay	Clarence M. Colony
John Hano	J. F. Cullen	John J. Dunne
E. J. Moran	J. E. Morrell	Michael Kovar
P. M. Howe	E. M. Birdsall	W. D. Gartland
J. R. Tighe	H. R. Topping	W. W. Redfern
E. J. Bullis	Edwin Krapf	Solomon Leibowitz
F. M. Sisson	J. F. Gilbert	W. J. Zabel
L. P. M. Gaylord	H. F. Kinney	L. S. Hulburd
John J. Phalan	E. A. Close	C. V. O'Malley
J. F. Larney	Ernest Budlong	R. D. Cameron
Allen Mattison	Raymond J. Golding	

Review of Conditions

Although the canal was thrown open for boats of Barge canal dimensions on May 15, there were several places where much work still remained to be done — places where only a 50-foot bottom width of channel had been excavated, localities where extensive wash-wall protection remained to be placed, bridges and other structures which were unfinished, and terminal docks which were by no means complete. However, with the obstacles of increased cost and scarcity of materials and labor and the restrictions by the Federal Government to contend with, the

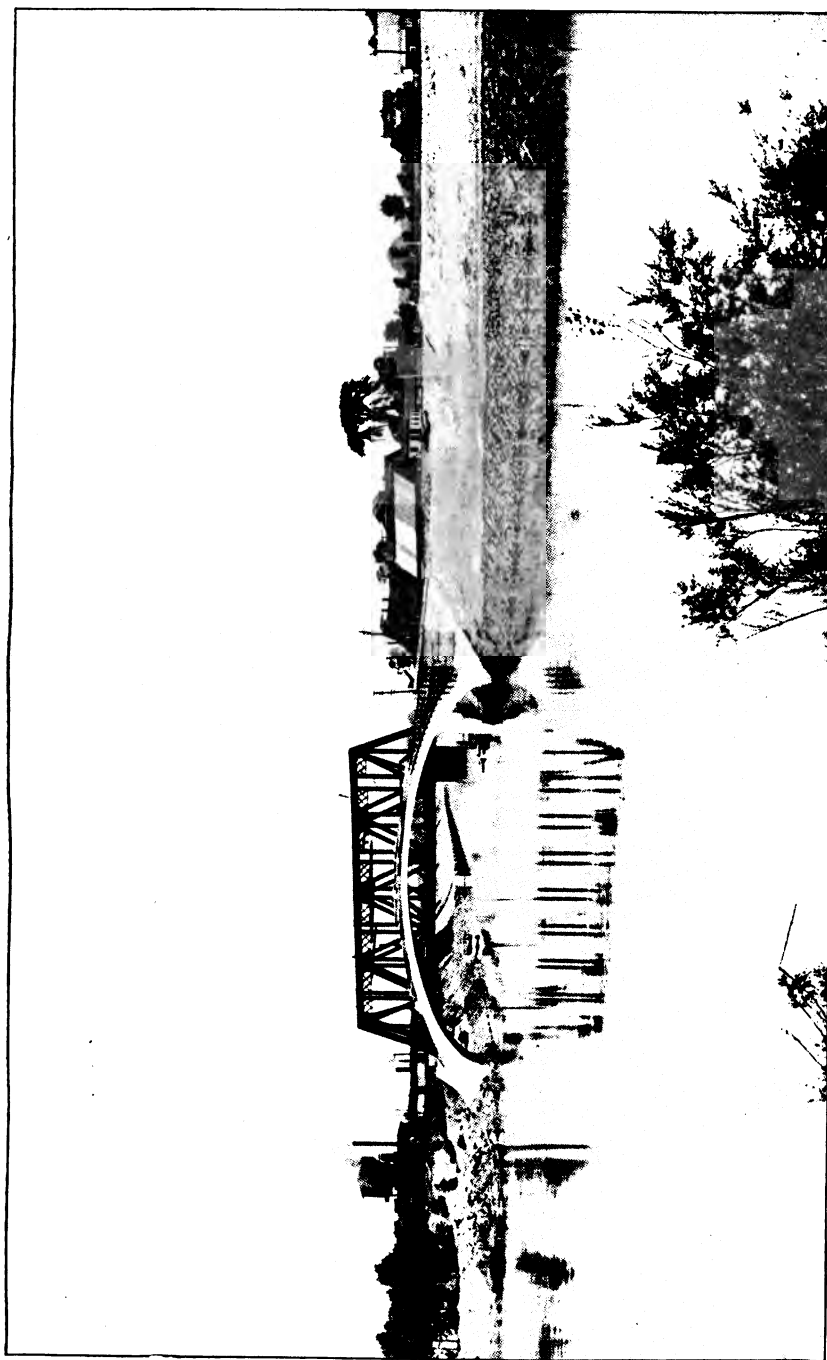
Department had to be unremitting in its efforts to procure even this degree of completion. How unremitting were these efforts the following outline will serve to indicate:

On contract No. 47-A, between Lyons and Clyde, the extensive work of dredging had been taken over during the preceding year and was progressed energetically by State forces. The total excavation removed during the twelve months amounted to 950,000 cubic yards, much of which was difficult material and some of it rock, submerged under the waters of the Clyde river. The work between Newark and Lyons involved the closing of several canal crossings and excavation beneath railroad bridges, which was pushed vigorously only by the utmost efforts and constant attention of the Department.

It became evident in the early spring that the work from Fairport to King's Bend, west of Pittsford, would not be completed with anything like the existing rate of progress, and this work was therefore taken over and a supervisor appointed by the Superintendent of Public Works. Forces and plant were assembled from every possible source and a channel of the width necessary to pass the new barges was excavated throughout the length of this contract, and also the Irondequoit concrete trough was completed according to a permanent design, both in time for the opening of navigation. A maximum of 730 men and 65 teams were in service here during the height of activities; also five steam-shovels and a corresponding amount of other equipment were utilized.

On the contract extending from King's Bend to Genesee Valley park it was necessary to apply vigorous methods, and only a 50-foot channel could be obtained through the heavy cuts at the west end.

On the park section, which was included with the Rochester harbor contract, orders were given to transfer the excavating machines on the river work to the main line in the park and to concentrate efforts there, leaving the harbor to be finished at a subsequent date. Under an extra work order a temporary movable dam was constructed across the river, to serve the purpose of maintaining the pool in the Barge canal until such time as the permanent steel structure could be erected three miles below, in the city of Rochester.



WEST BANK OF THE GENESEE RIVER AT THE BARGE CANAL CROSSING

The Barge canal crosses the Genesee in a pool formed by a dam. The canal channel to the west is here shown. The structure at the entrance is a foot-bridge, which is a part of the Genesee Valley park system.

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The contract through the rock cut west of the Genesee river had been progressed with commendable speed by the Woolsey Construction Company, subcontractor for the Walsh Construction Company, and this contract was practically completed at the time navigation was opened. At the junction of the old and new canals at South Greece, west of Rochester, it had been determined earlier in the year to build a small junction lock, so as to admit boats to the stretch of old canal passing through the center of that city, which was then to be maintained temporarily for service to Rochester. This contract had to be expedited by supplying to the contractor a part of the forces assembled by the State for work on the Pittsford section and with that assistance it was possible to complete the lock and the vital part of the contract work in time for the opening of navigation.

At Lockport the Adams street lift-bridge was in readiness, but great difficulty was experienced in the dredging of Tonawanda creek because of an extensive slide which carried several thousand yards of material into the prism only a short time before the date set for the opening of navigation. However, a 50-foot channel was obtained through this section. In spite of unexpectedly hard material encountered in excavating the stretch of prism at Pendleton and at Sulphur Springs, the work was completed as planned, both here and also through the city of Tonawanda, where the new contract — No. 83 — was located. A temporary bridge was built at Webster street, Tonawanda, to permit the passage of barges until such time as a new bascule bridge can be completed.

Although it has been difficult in many cases to get the necessary progress on the part of the contractors, most of them have responded with creditable energy and in all cases the peculiar difficulties under which they labored explain the frequent delays and lack of progress. This response justifies me in commending warmly those who held out and made it possible to open the canal at the appointed time. Since the passage of the Walters bill, which provides for giving due consideration to those contractors who assumed their contractual obligations before the declaration of war and who have been beset with the unusual inflation in prices and scarcity of labor, the Canal Board has announced its intention of extending relief to these contractors. It is prob-

able that for that purpose extensive readjustment of existing contracts will be made and also that reimbursement will be granted where there has been a loss in carrying out the work.

Railroad Crossings

The problem of railroad crossings, which has been so difficult of solution during past years, was attacked insistently when it was first determined to open the canals to their full capacity this season, and one by one negotiations with the various railroads have been consummated.

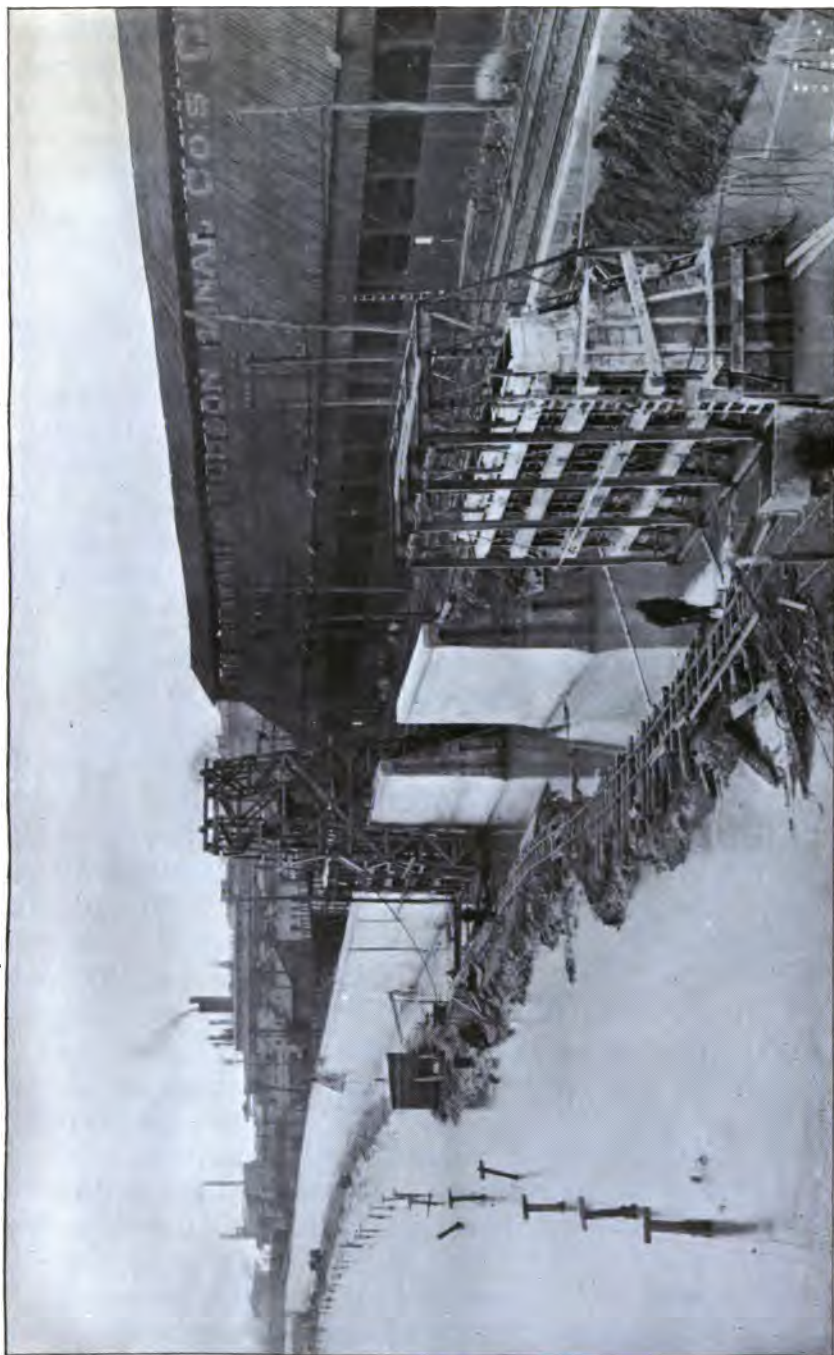
The main line crossing of the New York Central east of Lyons, which had been greatly simplified by inserting a Taintor gate in the dam at lock No. 26, Clyde, was constructed largely during the year. It has a width sufficient for six tracks.

The West Shore and Auburn railroad crossings near Pittsford involved new structures throughout, but progress was sufficiently rapid on these bridges to complete them well before the time set for the opening of navigation. The same is true of the Lehigh Valley crossing south of Rochester, and this bridge is being used to carry the detour tracks of the Erie railroad (which occupies a roadbed immediately adjacent on the west) until such time as the superstructure of that bridge can be erected, its abutments having been carried above pool level prior to the filling of the canal.

Although the Pennsylvania spur line bridge west of the Genesee was completed in good time, it became apparent that difficulties in the steel market would prevent shipment of the main line Pennsylvania superstructure in due season. The abutments were therefore completed and arrangements made with the railroad company to divert its traffic to Rochester by way of the B., R. & P. tracks at the junction of the two roads south of Rochester, the expectation being that the steelwork could be placed during the summer and traffic resumed over the Pennsylvania lines.

The new Erie bridge over the Genesee river was also completed early in the season.

A relocation of the railroad lines at Tonawanda will eliminate the Main and Webster street bridge. The branch which has



WALL ON WEST SIDE OF THE GENESEE RIVER IN ROCHESTER .
High walls for a considerable distance on both sides of the Genesee confine the river and prevent flood damage.

used this bridge, after making a rather long detour, will reach the new bascule bridge which is being built for the Batavia branch. This new bridge will then carry both roads. While this new construction has been in progress, temporary spans, raised to give sufficient clearance, have been in use.

SPECIAL APPROPRIATIONS

Ellicott Creek Improvement

(Chapter 624, Laws of 1913; chapter 728, Laws of 1915; chapters 181 and 760, Laws of 1917.)

Contractor, J. W. Hennessy, Inc., Buffalo, N. Y.

Date of contract, April 18, 1918.

Engineer in charge, R. W. Cady, Assistant Engineer.

Appropriations	\$135,000.00
Engineer's preliminary estimate.....	86,803.25
Contractor's bid	86,885.30

This contract is for completing the improvement of Ellicott creek. The first contract for this work included some other work and on December 10, 1914, was awarded to F. L. Cohen of Buffalo, N. Y., who during December of 1915 had completed nearly all of the work under his contract with the exception of the prism excavation. Because of failure to progress the work, the Superintendent of Public Works canceled the contract on June 20, 1916. This work was done under chapter 624, Laws of 1914, which made an appropriation of \$80,000.00 for the purpose, and also under chapter 728, Laws of 1915, which reappropriated the unexpended balance of this amount.

An attempt was made to relet the work in November, 1916, but the bids received were in excess of the amount of the appropriation then available. The Legislature of 1917, by chapter 181, reappropriated the unexpended balance, \$33,711.38, and by chapter 760 appropriated an additional sum of \$55,000.00. New plans and estimate were then prepared and the contract was readvertised and awarded.

The present contractor has been dredging the prism with a small floating clam-shell outfit, but has made little progress. The channel has been deepened to 6½ feet, so that old canal boats

can navigate it with the water-surface at the elevation of the new Barge canal pool. None of the excavated material has been finally disposed of and, therefore, no payments have been made for this work.

Negotiations have been in progress with the Erie and International Railway companies pertaining to the necessary alterations to their trestle bridges across this creek, but it may be found difficult to undertake this work with the funds available from this appropriation after payment for the other work has been made.

Concrete Culvert Over Eighteen-Mile Creek

(Chapters 181 and 626, Laws of 1917)

Contractor, Russell R. Ames, Inc., Rochester, N. Y.

Date of contract, January 30, 1918.

Amount of appropriation	\$12,500.00
Engineer's preliminary estimate.....	10,805.00
Contractor's bid	11,236.00
Value of work done to June 30, 1918.....	340.00

This contract is for constructing a concrete culvert, or sewer, along Eighteen-Mile creek, Lockport, between Pound street and Cleveland place, a distance of approximately 940 feet, and also for constructing the necessary head-walls and appurtenances at the two extremities. The clearing on this work has been nearly finished, but nothing else has been done.

Chadakoin River Improvement

(Chapter 758, Laws of 1913; chapter 728, Laws of 1915; chapter 181, Laws of 1917)

Contractor, George L. Maltby, Jamestown, N. Y.

Date of contract, March 23, 1916.

Amount of appropriation	\$100,000.00
Engineer's preliminary estimate.....	89,252.25
Contractor's bid	92,074.25
Value of work done to June 30, 1918.....	8,570.00

Very little work has been done on this contract during the year, and on June 18, 1918, the Superintendent of Public Works, on account of the slow progress, suspended the work. The head-gates of the raceway are completed, also one abutment of the new Warner dam. The coffer-dam is in place for building the rest of the structure and water is being passed around to the south by a wooden flume. Considerable excavation has been done just below Fairmount avenue bridge.

Hertel Avenue Bridge Improvement

(Chapter 761, Laws of 1917)

Contractor, Lupfer & Remick.

Date of contract, March 15, 1918.

Engineer in charge, E. H. Anderson, Assistant Engineer.

Amount of appropriation.....	\$30,000.00
Engineer's preliminary estimate	\$27,937.50
Contractor's bid	27,967.20
Value of work done to June 30, 1918.....	5,750.00

Work was started this spring, and excavation has been finished for the two abutments, most of the piles are driven and concrete work has been started on the west abutment. The excavated material was used in making the fill for the west approach.

BLUE LINE SURVEY

(Chapter 181, Laws of 1917)

Very little work of surveying and mapping the canal blue line was done on this Division during the current year, as it was determined to finish certain work under way in the other divisions. There are, however, duly certified maps on file, based on the recent surveys and covering sections east of Lyons and the entire Rochester cut-off. Also work of surveying and mapping has progressed to quite an extent in Buffalo and at some other points in the Division.

COURT OF CLAIMS SURVEYS

(Chapter 181, Laws of 1917)

The usual work of surveying and mapping in connection with the work of the Court of Claims has been performed and has involved a very considerable amount of time and effort, especially during those periods when the Court of Claims was in session on local cases. Extensive surveys and maps have been made covering lands along the Clyde river and the Oak Orchard feeder. The appropriation for this work is not sufficient from year to year to cover the requirements.

MONUMENTING CANAL LANDS

A small amount of work has been done in the monumenting of the new right of way of the Barge canal and in progressing the set of maps on which it is planned to show both this right of way and all the structures of the Barge canal throughout the length of the Division.

SURVEYS FOR GRANTS OF LAND UNDER WATER AT BUFFALO

Several surveys and maps have been made in connection with additional applications for land under the waters of Lake Erie at Buffalo, and the Niagara river at Tonawanda and North Tonawanda.

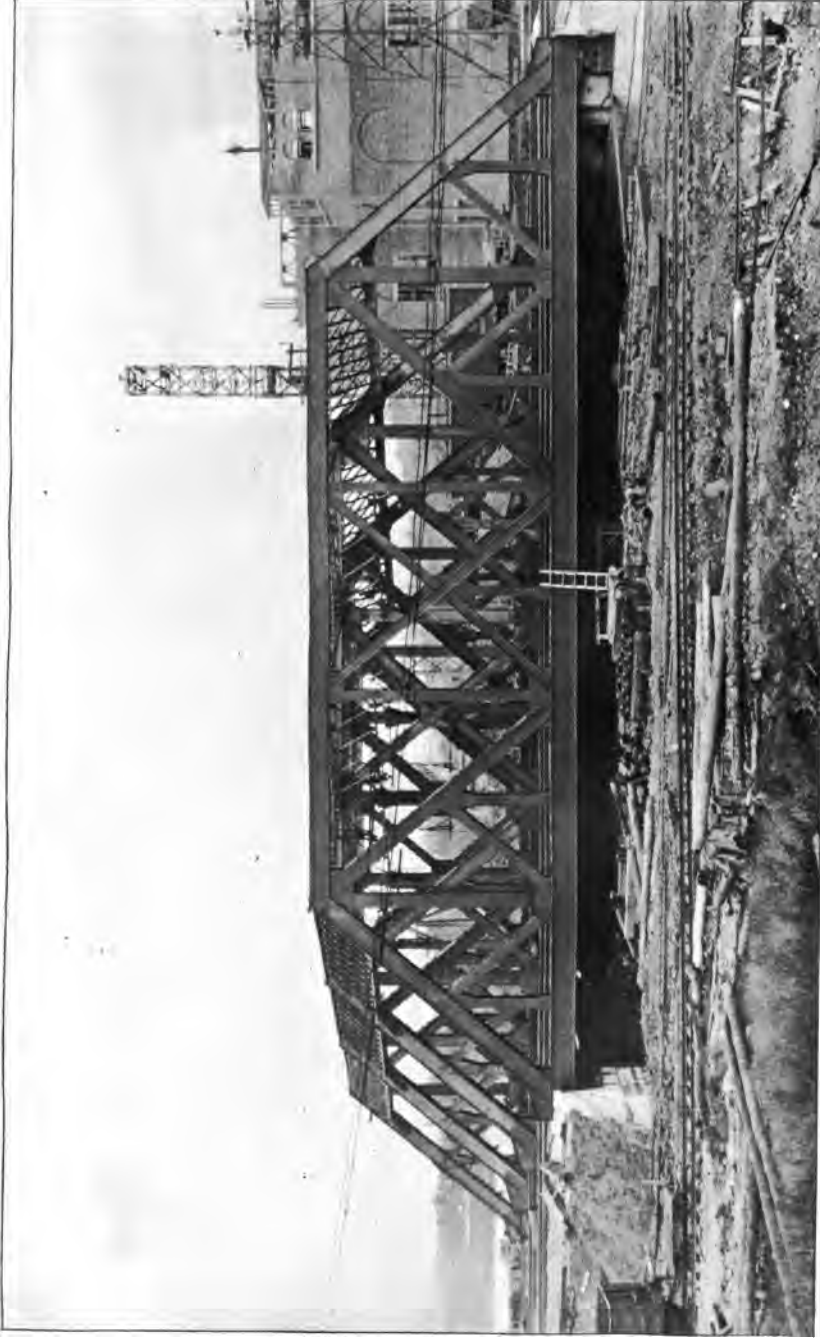
BARGE CANAL AND TERMINAL ORGANIZATION

The Barge canal and terminal construction, which has constituted by far the largest part of my work, has been directed from my headquarters office at Rochester and four residencies, organized as follows:

Residency No. 8, covering Wayne county, L. S. Hulburd, Senior Assistant Engineer, in charge, with headquarters at Lyons.

Residency No. 9, portion covering Monroe county with the exception of the Rochester harbor and vicinity, A. E. Steere, Senior Assistant Engineer, in charge, with headquarters at Rochester.

Residency No. 9, portion covering Rochester harbor and the section of main line canal through Genesee Valley park, A. R.



NEW YORK CENTRAL (MAIN LINE) BRIDGE ACROSS THE BARGE CANAL EAST OF LYONS
After the bridge had been erected a dredge completed the canal under the structure. The bridge is of heavy construction and carries six tracks.

Morse, Senior Assistant Engineer, in charge, with headquarters at Rochester.

Residencies Nos. 10 and 11, covering Orleans, Niagara and Erie counties, B. E. Failing, Senior Assistant Engineer, in charge, with headquarters at Buffalo.

Reports of these engineers, giving detailed statements of work under their charge, follow.

ERIE CANAL, RESIDENCY No. 8

Senior Assistant Engineer L. S. Hulburd reports:

Reports are given on the following contracts: Contracts Nos. 84, 141, 148, 154, 159 and 164, parts of Nos. 172 and 173, terminal contract No. 31 and parts of terminal contracts Nos. 106 and 211, and also on the work of finishing contract No. 47-A and the railroad crossings in this residency.

Contract No. 47-A—Special Agreement

Contract No. 47-A, which was for completing the construction of the canal from the town line about five miles southeast of the village of Clyde to a point near the New York Central railroad crossing at Lyons, was suspended by the Canal Board on March 21, 1917. On March 27, the Superintendent of Public Works proceeded to complete the work, employing the Sherman-Stalter Co. with its plant and force for the purpose. Payments on this work during the year amount to \$703,540, total to date, \$911,107.

F. W. Madigan, Assistant Engineer, is in charge.

Dredging operations were continued during the winter months and the prism excavation was completed on May 23, 1918.

At the through cut one mile below lock No. 26 and above the West Shore bridge at Lyons, well drills were used and the hard material was loosened by blasting. For part of the distance between Creagers bridge and the "Y" bridge the drilling was done from a drill-boat and the hard material was blasted.

The Taintor gate at lock No. 26 was erected during the summer and fall of 1917 and the cribs above lock No. 26 were built.

The retaining wall along the West Shore railroad was completed. The excavation for this wall was done with a dipper-dredge and a clam-shell excavator. Rapid progress was made in placing the concrete and 490 linear feet of wall was built between April 1 and June 30. This wall is 18 feet high and was built in 13 feet of water. A floating concrete plant and a gravel scow were used, the forms were built in panels 21 feet long with an outside framework of steel sheet-piling and the concrete was placed under water with a tremie.

Contract No. 84

This contract is for constructing portions of a viaduct over the Clyde river and railroad tracks at Clyde. It was awarded to Lupfer & Remick, being signed on March 9, 1917. Construction work began March 2, 1917. The engineer's preliminary estimate was \$83,948.50, the contractor's bid, \$80,661.80. The contract price as modified by alterations Nos. 1, 2 and 3 is \$83,078.66. The value of work done during the year is \$19,780, total done to date, \$37,300. The amount paid on extra work orders during the year is \$20,000.00, total to date, the same.

J. A. Sloat, Junior Assistant Engineer, is in charge.

Alteration No. 3, approved by the Canal Board October 31, 1917, provides for substituting reinforced concrete for cast-iron pipe under the north approach to the bridge. It decreases the contract price by \$798.00.

An extra work order dated July 31, 1917, provides for reconstructing the stone sewer encountered in the foundation of the north abutment. The final account, amounting to \$2,000.00, was approved by the Canal Board September 5, 1917.

The fourth pier and the north abutment were built, completing the second-class concrete on this contract.

The backfill for the south abutment was partially done in 1917 and completed in May, 1918. Also the grading of the road leading to the south approach was completed. The drainage culvert in the old canal was built and about 90 per cent of the fill in the north approach was placed.



LOCK NO. 27, AT LYONS

The view shows a second Taintor gate (constructed under contract No. 154) and the abutments for Leach street bridge (being built under contract No. 148). This lock stands at the head of the Clyde river, Ganargua creek and Canandaigua outlet uniting at its side to form the river.

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The steel for the superstructure has been delivered and about 231 feet of the viaduct over the N. Y. Central tracks has been placed and bolted.

Contract No. 148

This contract is for constructing the substructure, superstructure and approaches of a highway bridge across lock 27 and the Clyde river at Leach street, Lyons. It was awarded to Lathrop, Shea & Henwood Co., being signed on September 5, 1917. The engineer's preliminary estimate was \$65,810.60, the contractor's bid, \$66,986.20. The value of work done to date is \$7,270.

F. W. Madigan, Assistant Engineer, is in charge.

A little work was done on erecting plant in the fall of 1917, but construction work was not begun until June, 1918, when the excavation for the north abutment was finished and about three-fourths of the concrete for this abutment was placed.

A coffer-dam for the south abutment was built and excavation started.

Contract No. 154

This contract is for constructing an additional Taintor gate in the dam at lock No. 27, Lyons. It was awarded to Lupfer & Kemick, being signed on April 7, 1917. Construction work began May 1, 1917. The engineer's preliminary estimate was \$7,802.70, the contractor's bid, \$8,582.50. The value of work done during the year is \$8,409. The work was accepted June 26, 1918, and the final account, amounting to \$8,409.30, was approved by the Canal Board November 13, 1918.

F. W. Madigan, Assistant Engineer, was in charge.

The concrete pier was completed, the section of the old spillway removed and the steel Taintor gate erected.

The contract was completed in May, 1918.

Contract No. 164

This contract is for completing the construction of the canal at certain locations between Lyons and Newark and for constructing a retaining dam at Macedon. It was awarded to Lathrop, Shea & Henwood Co., being signed on October 30, 1917. Construction work began November 8, 1917. The engineer's pre-

liminary estimate was \$124,313.00, the contractor's bid, \$159,848.25. Excess steel sheet-piling to the value of \$5,750.00 has been authorized by the Canal Board. The value of work done to date is \$81,980.

W. W. Brown, Assistant Engineer, is in charge.

An extra work order dated December 1, 1917, provides for installing a sluice-gate in the spillway above the lock, to provide drainage for the level above lock No. 28-A, at a lump price of \$1,500.00.

An extra work order dated April 26, 1918, provides for furnishing and driving steel sheet-piling across an opening in the bank east of the old poorhouse lock on the north side of the canal, payment to be on the basis of cost plus 15 per cent.

An extra work order dated May 24, 1918, provides for stopping seepage and reinforcing the banks at several places as directed by the engineer, payment to be on the basis of cost plus 15 per cent.

A large steam-shovel began operating in November, 1917, and worked through the winter, completing the prism above lock No. 28-A and nearly finishing the canal crossing above the poorhouse. One small revolving shovel was operated during the winter at the canal crossing east of the New York Central bridge, and a third shovel, of the revolving type, was started in March at the West Shore bridge.

In order to provide a navigation channel by the fifteenth of May, the shovels were removed and a suction dredge was brought to the contract on May 9. By June 2 this dredge completed the channel to full depth and nearly to full width at the railroad crossings and at the crossing of the old canal just to the east of the N. Y. C. crossing.

The other work done on this contract includes the driving of steel sheet piling was driven in the canal bank across an old ditch ditching, raising embankments, the partial completion of the dikes above lock No. 27 and some of the grading on the poorhouse bridge road.

Under extra work orders a valve was placed in the spillway, steel sheet-piling was driven in the canal bank across an old ditch and at several places the embankment was widened and reinforced.

Contract No. 159

This contract is for placing embankment on the north canal bank between Newark and Palmyra and extending Ganargua creek spillway. It was awarded to I. M. Ludington's Sons, Inc., being signed on March 27, 1917. Construction work began April 9, 1917. The engineer's preliminary estimate was \$30,464.00, the contractor's bid, \$28,476.00. The contract price as modified by alterations Nos. 1, 2 and 3 is \$43,258.50. The value of work done during the year is \$27,430, total done to date, \$33,660.

W. W. Brown, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board September 18, 1917, modifies the cross-section of the portion of the Ganargua creek spillway built under this contract. It increases the contract price by \$12,282.50.

Alteration No. 2, approved by the Canal Board January 9, 1918 provides for driving piles under the foundation of the apron of the Ganargua creek spillway. It increases the contract price by \$1,250.00.

Alteration No. 3, approved by the Canal Board February 20, 1918, provides for driving additional piles for the foundation of the apron of the Ganargua creek spillway. It increases the contract price by \$1,250.00.

The steel sheet-piling has been driven and concrete placed for the crest of the spillway. The contract is completed except for placing about 700 cu. yds. of riprap and some other miscellaneous work.

Contract No. 141

This contract is for constructing a new power-station at lock No. 29, Palmyra. It was awarded to W. F. Maas & Son, being signed on March 8, 1917. Construction work began April 2, 1917. The engineer's preliminary estimate was \$41,166.76, the contractor's bid, \$41,180.75. The value of work done during the year is \$6,930, total done to date, \$11,760.

W. W. Brown, Assistant Engineer, is in charge.

The contractor built the upper wing-walls, drove the round piles and the steel sheet-piling, and partially excavated for the

power-house foundation, which was enclosed with wooden sheeting.

The work was shut down for the winter on December 1 and has not been started since.

Contract No. 172

The portion of this contract affecting this residency provides for furnishing and delivering at Lyons 23 red and 25 black lamp-posts, for aids to navigation in the Clyde river. The contract was awarded to Lupfer & Remick, being signed on March 15, 1918. The engineer's preliminary estimate for the whole contract was \$14,853.00, the contractor's bid, \$13,063.20. The contract price as modified by alteration No. 1 is \$12,921.45. The value of work done to date on this residency is \$370.

J. A. Sloat, Junior Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board May 23, 1918, eliminates the requirements for galvanizing the hoops on the barrel buoys. It decreases the contract price by \$141.75.

The lamp-posts for this residency are all completed.

Contract No. 173

The portion of this contract affecting this residency provides for furnishing and delivering at Rochester 25 oil-burning lanterns for buoy, stake and bridge lights on the Genesee river. It was awarded to R. B. Wing & Son, being signed on February 9, 1908. The engineer's preliminary estimate was \$19.00 per lantern, or \$475.00 for this residency, the contractor's bid, \$17.92 per lantern, or \$448.00 for this residency. On June 26, 1918, the Canal Board accepted the work and approved the final account, the amount being the same as the contractor's bid.

These lanterns were duly delivered and accepted.

Terminal Contract No. 31 — Lyons

This contract is for constructing a dockwall and an approach at Lyons. It was awarded to Lupfer & Remick, being signed on September 30, 1916. Construction work began September 27, 1916. The engineer's preliminary estimate was \$57,925.00, the



BARGE CANAL TERMINAL AT LYONS

View showing dockwall built, approach under construction and site graded, in readiness for the warehouse to be erected.

contractor's bid, \$51,653.80. The value of work done during the year is \$15,550, total done to date, \$32,050.

F. W. Madigan, Assistant Engineer, is in charge.

During the year 190 feet of dockwall have been built, which completed a total length of 360 feet. The berme back of the wall was graded for the west end of the wall.

Work was shut down from January 21 to March 5 and no work has been done since May 18. Application has been made for the State to take over the contract as provided for under the Walters act.

Terminal Contract No. 106

This contract is for furnishing fourteen two-ton steam tractor cranes for Barge canal terminals. One of these is for the terminal at Lyons. The contract was awarded to the John F. Byers Machine Co., being signed on February 14, 1918. The engineer's preliminary estimate was \$5,250.00 per crane, the contractor's bid, \$5,265.00 per crane. The contract price as modified by alteration No. 1 is \$5,515.00 per crane.

Alteration No. 1, approved by the Canal Board March 27, 1918, provides for housing the fourteen cranes under this contract. It increases the contract price by \$250.00 per crane.

This crane has not been delivered.

Terminal Contract No. 211

This contract provides for constructing frame warehouses at Newark, Albion and Medina. The following report is for the work at Newark. The contract was awarded to W. F. Martens & Co., being signed on June 14, 1917. The engineer's preliminary estimate for this warehouse was \$3,000.00, the contractor's bid, \$2,765.00. The work was accepted October 16, 1917, and the final account, amounting to \$7,896.80 (\$2,725.70 for this warehouse), was approved by the Canal Board January 23, 1918. The amount paid on extra work orders is \$147.48, of which \$48.93 applies to this warehouse.

H. N. Metzger, Assistant Engineer, was in charge.

An extra work order dated July 23, 1917, provides for placing screens over the windows and doors of the warehouses. The final

payment, amounting to \$79.48 (\$48.93 for this warehouse), was approved by the Canal Board June 12, 1918.

The Newark warehouse was built in the summer of 1917, between July 3 and August 31.

Railroad Crossings

In connection with the work of providing necessary clearance at bridges over the canal and underpinning substructures, the New York Central Railroad Co., with the Walsh Construction Co. as contractors, has finished the miscellaneous work for completing the West Shore railroad bridge ("Y" connection) two miles east of Lyons, the West Shore bridge east of Newark and the main line bridge east of Newark.

The building of the masonry for the New York Central main line bridge east of Lyons was completed in August, 1917, and the erection of the superstructure was finished on November 12, 1917. A cast-iron pipe was placed in the old river channel and the fill under the girders of the bridge was made with a hydraulic dredge in June, 1918.

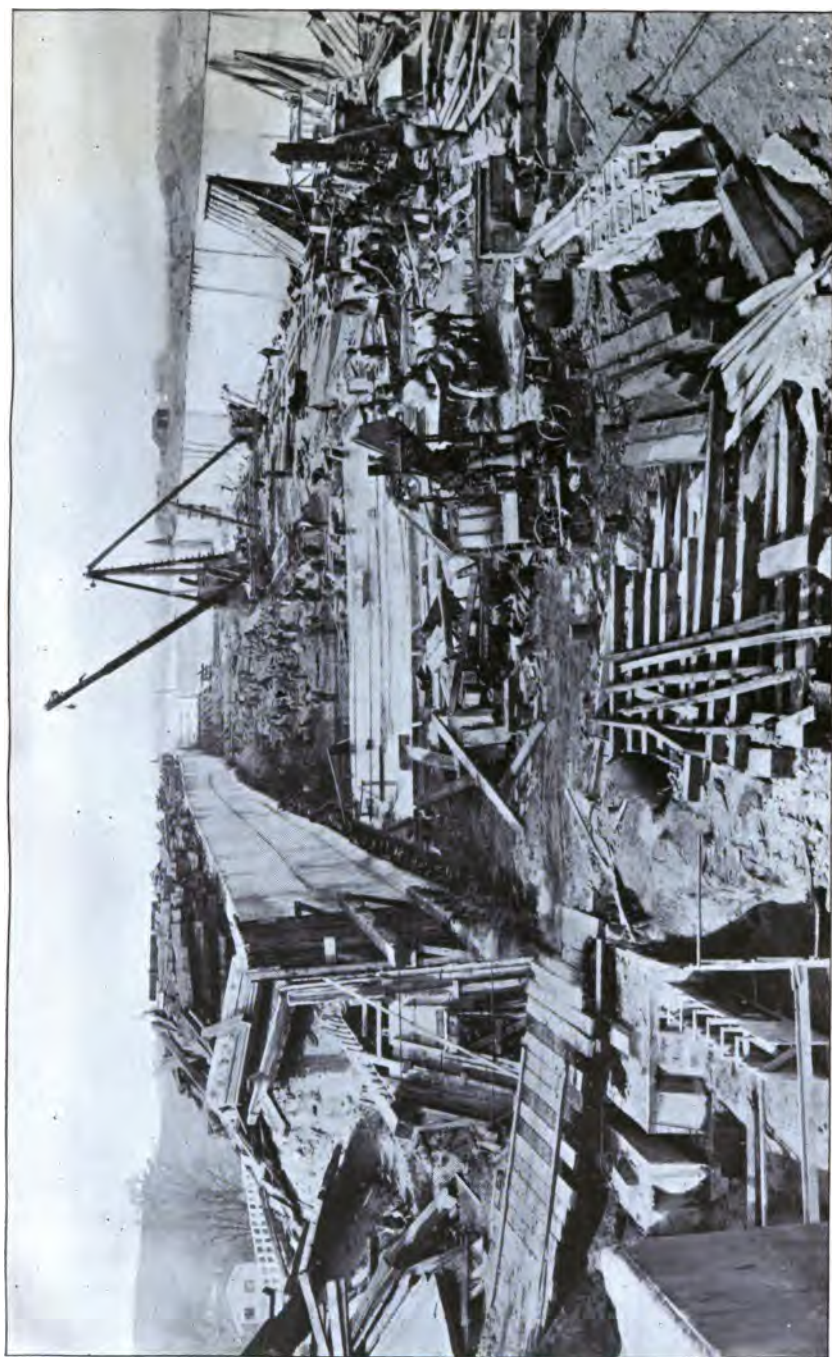
ERIE CANAL, RESIDENCY NO. 9

Senior Assistant Engineer A. E. Streere reports:

The portion of the residency under my supervision comprises contracts Nos. 21-A, 23-A, 63-A, 161, 162, 170, 172, 178 and 179. Reports on these contracts and on the railroad crossings within the same territory follow.

Contract No. 63-A

This contract is for completing the construction of the canal from the west line of Wayne county to the east end of contract No. 23-A at King's Bend. Length, 12.22 miles. It was awarded to the State Highway Construction Company, being signed on February 23, 1916. Construction work began April 6, 1916. The engineer's preliminary estimate was \$567,745.70, the contractor's bid, \$488,103.20. The contract price as modified by



CONSTRUCTION OF IRONDEQUOIT CONCRETE TROUGH

The walls and part of the floor were built while the wooden flume was still in place. At the close of navigation the removal of the flume began and before navigation reopened the trough had been completed.

alterations Nos. 1, 2 and 3 is \$581,861.50. Excess forming embankment, first-class, to the value of \$16,000.00 has been authorized by the Canal Board. The value of work done under the contract during the year is \$117,840, total to date, \$380,360. This contract was canceled by the Canal Board March 6, 1918, and the work has since been done by the Superintendent of Public Works. Payments made by him to July 1, 1918, amount to \$335,025.44. The amount paid on extra work orders during the year is \$61,995.38, total to date, \$68,818.45.

D. E. Bellows, Assistant Engineer, is in charge.

Alteration No. 2, approved by the Canal Board August 1, 1917, provides for changing the plan of the floor of the new trough, for moving the new trough eight feet south of the location shown on the original plans and for filling the Cartersville widewaters with second-class embankment to elevation 465.4. It increases the cost of the contract by \$78,036.30.

Alteration No. 3, approved by the Canal Board February 27, 1918, provides for restoring breaks in the south embankment at the Cartersville widewaters with first-class embankment instead of second-class embankment. It increases the contract price by \$3,222.00.

An extra work order dated April 2, 1917, provides for completing certain excavation and embankment under the Auburn branch railroad crossing at Cartersville, which was not included in contract No. 63-A. The purpose of this order was to secure a channel of sufficient width to pass boats at the opening of navigation. The final account, amounting to \$5,270.26, was approved by the Canal Board July 11, 1917.

An extra work order dated May 26, 1917, provides for filling the Cartersville widewaters to stop leakage and to prevent further damage to the canal bank. Payments to the total amount of \$59,331.27 have been made on this work order. The work of filling the widewaters was put under alteration No. 2 on August 1, 1917, but the bills were not all in at that time, so that payments were approved as late as February 27, 1918.

An extra work order dated February 2, 1918, provides for underpinning the south abutment of the Cartersville bridge and for removing and replacing concrete prism lining as directed.

The final account, amounting to \$4,216.92, was approved by the Canal Board March 6, 1918.

General construction operations on this contract were closed during the summer months on account of maintaining navigation on the present Erie canal. Therefore work during the summer season was limited to that which did not interfere with canal navigation. Shortly after the opening of navigation in 1917 the south bank across the Cartersville widewaters gave way, but the water was retained by the old Erie canal bank. The filling of the area between the old canal bank and the new prism lines was carried on under the extra work order dated May 26, 1917, up to August 1, 1917, and after that date under alteration No. 2. The material for this fill was obtained from the Smith spoil-bank west of Mitchell's bridge and also from a bank appropriated for that purpose along the Cartersville highway.

The south abutment of the Cartersville highway bridge was underpinned by means of carrying two concrete buttresses down to hard material. This work was performed under the extra work order of February 2, 1918.

The reconstruction of the concrete trough across Irondequoit creek was started in August, 1917. The north wall, a large portion of the north half of the floor and the south wall were completed before the close of navigation. Some of the concrete at the point of junction with the old work could not be placed until the timber flume was removed after navigation closed. The removal of the timber flume was started at the close of navigation and was completed about the first of March, 1918.

Each side wall of the reconstructed portion of the Irondequoit flume contains a combined inspection and drainage gallery. The joints between sections of the new wall were made water-tight by imbedding a strip of sheet lead into each block as it was built.

The floor of the trough consists of three separate layers of concrete, a gravel filtration basin and a layer of tar-felt waterproofing. This floor was built in the following manner: The bottom layer of concrete is 12 inches in thickness and slopes downward from the center toward the side walls. It is reinforced by deformed bars placed three feet on centers. This layer is divided into blocks 35 feet square. The joints between these blocks are covered with reinforced concrete patches 8 feet wide



COMPLETED IRONDEQUOIT CONCRETE TROUGH

Reconstruction at the point where the canal was carried in a temporary wooden flume after the break in the original trough.

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and 6 inches thick, one-half of each patch resting directly upon the concrete of a block, while the other half, resting upon the adjacent block, is separated from it by single-ply tar-felt waterproofing. The bottom layer of concrete is also sealed to the side walls by means of lead strips bent longitudinally in the form of a letter U and set with the edges entering the side walls and the floor sections, thus making a water-tight joint. The layer of concrete is covered with a layer of gravel, into which are laid 4-inch farm tile for collecting any leakage and carrying it to the side walls, where holes are provided to deliver such leakage to the drainage gallery. Overlying the gravel there is a layer of concrete, 8 inches thick, extending between the side walls and built in blocks about 30 feet square, reinforced in the same manner at the bottom layer. Over the 8-inch floor are three to five layers of waterproofing, while on the top of this is a 4-inch protecting layer of concrete, placed in blocks about 15 feet square.

The joining of the old and new sections of the floor was made in the following manner: The lower layer of concrete of the new construction was carried under that of the old floor for about 2 feet and then brought up to an elevation so as to enclose the edge of the existing floor about 6 inches above its bottom and thoroughly rammed to make water-tight contact with the old work. The junction between the old and new side walls was made in a somewhat similar manner, the back of the new wall being so constructed as to overlap the existing wall for about 8 feet, thus eliminating any possibility of seepage on account of contraction of the connecting sections.

The drainage collected in the north gallery is carried to the south gallery by means of a 12-inch flexible joint pipe, encased in reinforced concrete. From the south gallery the water is carried to the creek below by a 24-inch cast-iron pipe, encased in concrete and laid down the slope of the fill. After the canal was filled the leakage of the floor was found to be very slight.

Contract No. 63-A was canceled by resolution of the Canal Board on March 6, 1918, and the work was carried on by the Superintendent of Public Works. The plant of the contractor was utilized and also additional steam-shovel plants, with locomotives and dump-cars, were brought in to insure the opening

of a channel by May 15. The Riley & Knapp steam-shovel opened a channel more than 50 feet wide between Stas. 1926 + 80 and 1950, removing 41,280 cu. yds. The E. W. Foley steam-shovel, with numerous teams, made a channel between Stas. 1969 and 1996 + 50, removing 29,055 cu. yds. The material from both of these plants was deposited along the high bank at the Fairport widewaters. The Ludington steam-shovel and teams completed the channel to full width between Stas. 2053 and 2059, removing 12,317 cu. yds. The Walsh Construction Company's steam-shovel plant opened a channel from Sta. 2281 to Sta. 2295, over 50 feet wide at King's Bend, removing 21,674 cu. yds. All of this excavating equipment was removed from the canal prior to May 15.

Contract No. 179

This contract is for completing the canal prism at the New York Central and the West Shore railroad crossings near Pittsford. It was awarded to I. M. Ludington's Sons, Inc., being signed on November 9, 1917. The engineer's preliminary estimate was \$76,033.50, the contractor's bid, \$79,712.20. The contract price as modified by alteration No. 1 is \$84,992.20. The value of work done to date is \$62,190. The amount paid on extra work orders is \$992.00.

D. E. Bellows, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board April 24, 1918, provides for completing the embankment on the south side of the canal at the Cartersville widewaters, using material excavated under contract No. 179. It increases the contract price by \$5,280.00.

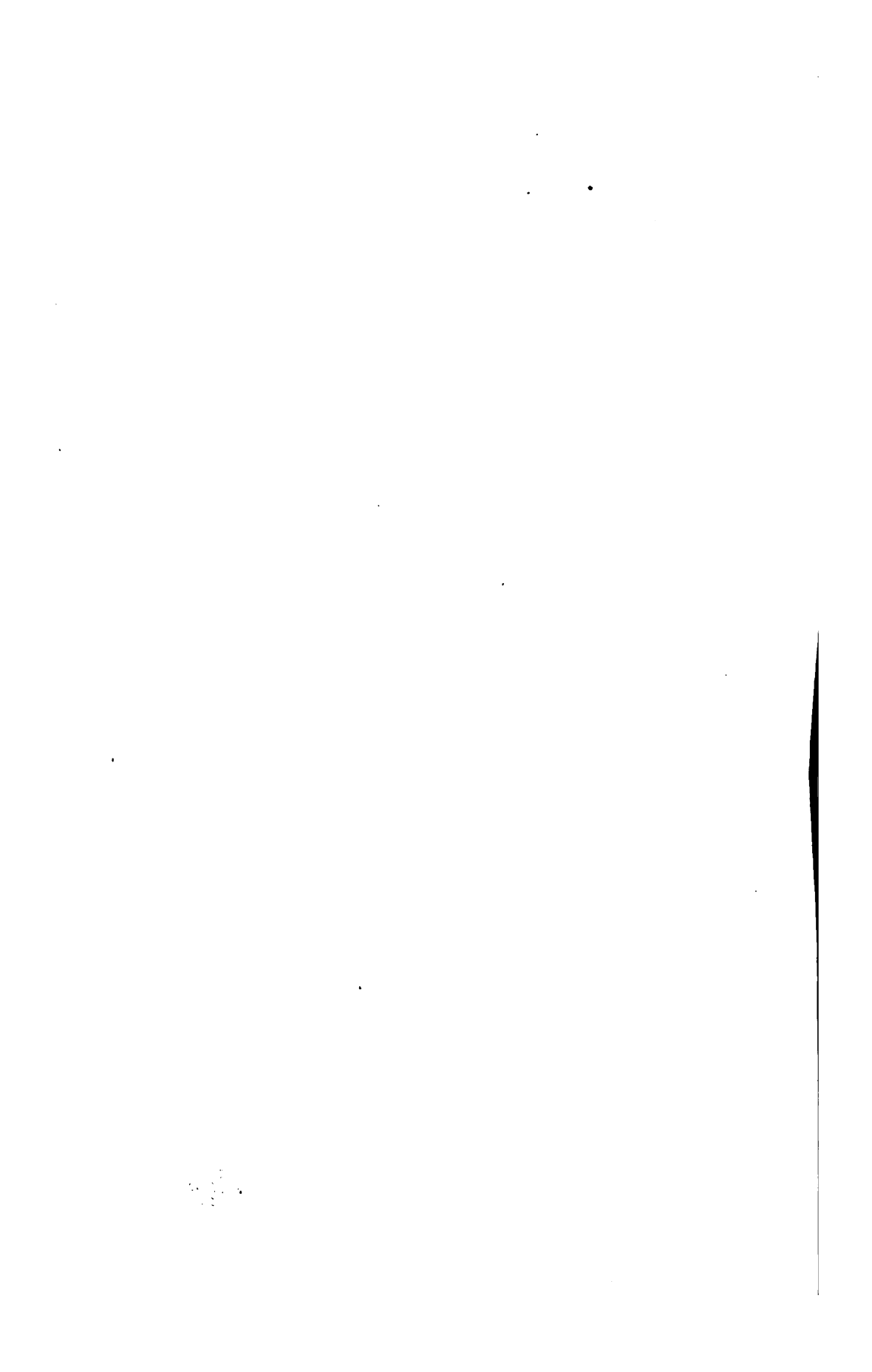
An extra work order dated February 9, 1918, provides for placing about 220 feet of 15-inch tile drain to prevent spoil from interfering with drainage. The final account, amounting to \$992.00, was approved by the Canal Board April 10, 1918.

The major portion of the excavation at both crossings was removed prior to the opening of navigation. That which remains consists principally of slope trimming and work of a minor nature. The splay wall and embankment near the Auburn railroad bridge and half of the apron above the guard-gate at Cartersville were completed when the work was stopped at the opening of navigation.



GUARD-LOCK AT THE EAST SIDE OF THE GENESEE RIVER CROSSING

Two guard-locks, one on each side of the crossing, protect the canal from floods in the river. Sluices are provided so that the structures may be used as lift locks if occasion demands. View taken as the gate was about to be raised for the opening of navigation in 1918.



Contract No. 23-A

This contract is for completing the construction of the canal from King's Bend to the Lehigh Valley railroad crossing about one-half mile east of the Genesee river. Length, 5.13 miles. It was awarded to H. S. Kerbaugh, Inc., being signed on May 20, 1916. On July 3, 1917, it was assigned to the Empire Engineering Co., Inc., and this assignment was approved by the Superintendent of Public Works August 14, 1917. Construction work began on July 8, 1916. The engineer's preliminary estimate was \$651,703.10, the contractor's bid, \$630,568.42. The contract price as modified by alterations Nos. 1 and 2 is \$745,672.42. The value of work done during the year is \$319,560, total done to date, \$461,810.

C. L. Baldwin, Assistant Engineer, is in charge.

Alteration No. 2, approved by the Canal Board August 1, 1917, provides for placing wash wall on both sides of the canal where it had been omitted between Sta. 2358, at East Henrietta road, and the guard-lock, for reinforcing the piers of the guard-lock by-pass and for increasing the item of furnishing, erecting and painting metal in lock-gates, lock-valves and buffer-beams. It increases the contract price by \$118,104.00.

An extra work order dated September 29, 1917, provides for reaming holes, chipping and fitting members of metal in lock-gates furnished and delivered under old contract No. 23, payment to be made on the basis of cost plus 15 per cent.

An extra work order dated December 31, 1917, provides for constructing a temporary cut-off and retaining wall at the west end of the guard-lock, payment to be made on the basis of cost plus 15 per cent.

The excavation for the guard-lock was made with a steam-shovel plant and a Lidgerwood machine equipped with a drag-line bucket, the material being disposed of in embankment and spoil by locomotives and dump-cars. In the latter part of September the concrete plant was erected and concrete work for the guard-lock was started. During February the work was stopped on account of cold weather and at other times progress was irregular and many delays occurred because concrete materials could not be delivered in sufficient quantities when needed. This

latter condition was due largely to railroad congestion. However, on May 29, the concrete for this lock was completed except for minor details.

Between the guard-lock and the east Henrietta road bridge excavation progressed, but unstable material caused many delays and the work was not finished by May 15, the date that navigation opened. The plant used consisted of two steam-shovel plants and the Lidgerwood drag-line machine.

During the months of April and May the low banks in the vicinity of South and Clinton avenues were raised for navigation purposes. Two steam-shovel plants and dump-cars were employed, one being located on the north and the other on the south side of the canal.

The driving of steel sheet-piling in the toe of the high banks west of lock No. 33 was started in the latter part of August and continued until the first of May. Delays were numerous and progress slow. The equipment was meager and at times the quantity of steel piles on hand for driving was small. When navigation opened this work was stopped, although it had not been completed.

The lower gates of lock No. 32 were completed and adjusted and made ready for operation. The west gate of the guard-lock was erected and painted and the operating machinery was installed. Wash wall was placed in the wash-wall notch for a considerable distance west of lock No. 33 and along several incomplete stretches on the north slope between the guard-lock and the east Henrietta road bridge.

Shortly after the opening of navigation a dipper-dredge, derrick-boat and scows were brought to this contract and the excavation is now being done by dredging. Material at present is being spoiled on low areas west of lock No. 33.

Contract No. 178

This contract is for constructing additional protection work in the by-passes at locks Nos. 32 and 33. It was awarded to W. F. Martens, being signed on March 12, 1918. The engineer's preliminary estimate was \$41,706.00, the contractor's bid, \$49,844.00. The value of work done to date, \$47,272. The



EXCAVATION IN THE HEAVY CUT SOUTHEAST OF ROCHESTER

The view, which is looking east from the bridge on the west road to Henrietta, was taken early in the winter preceding the opening of through navigation in the spring of 1918.

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work was accepted June 26, 1918, and the final account, amounting to \$47,271.62, was approved by the Canal Board September 24, 1918.

C. R. DeGraff, Assistant Engineer, was in charge.

The work at lock No. 33 consists in raising the by-pass banks, placing concrete slabs above and below the upper spillway, and placing additional protection at the lower spillway and concrete adjacent to and around the enclosed by-pass conduits. A line of $\frac{3}{8}$ -inch steel sheet-piling was driven as a cut-off around the upper by-pass spillway, being carried from the south bank to the power-house. Also a line of steel sheet-piling was driven in the north canal bank, extending for about 600 feet westerly from the upper end of lock No. 33 and joining with steel sheet-piling driven under contract No. 23-A.

The construction work around lock No. 32 was of a similar nature to that at lock No. 33, excepting that no steel sheet-piling was used at that location.

Contract No. 161

This contract is for furnishing and delivering electric motors and certain machinery at Rochester. It was awarded to Lord Construction Co., being signed on August 3, 1917. The engineer's preliminary estimate was \$5,972.00, the contractor's bid, \$6,452.00. The contract price as modified by alteration No. 1 is \$15,867.35. The value of work done to date is \$9,040. The amount paid on extra work orders is \$482.00.

Gordon Edson, Assistant Engineer, is in charge of the west guard-lock, and C. L. Baldwin, Assistant Engineer, is in charge of the east guard-lock.

Alteration No. 1, approved by the Canal Board February 27, 1918, provides for installing the electric operating and lighting equipment on these two guard-locks. It increases the contract price by \$9,415.35.

An extra work order dated May 10, 1918, provides for temporary machinery for operating the guard-locks. The final account, amounting to \$482.00, was approved by the Canal Board June 12, 1918.

The electric motors, cabinets and lighting system were installed on the west guard-lock, while the motors and cabinet were installed on the west gate of the east guard-lock. The installation of the operating equipment for the east gate of the east guard-lock is delayed until the completion of the east gate of this lock.

Contract No. 21-A

This contract provides for completing the canal from about Sta. 2449, about 400 feet west of the Genesee river, to about Sta. 2566 + 58, about 442 feet from the east end of contract No. 6. Length, 2.23 miles. It was awarded to the Walsh Construction Co., of Davenport, Iowa, being signed on February 16, 1916. Construction work began March 1, 1916. The engineer's preliminary estimate was \$415,700.00, the contractor's bid, \$384,928.69. Excess concrete, second-class, to the value of \$9,000.00 has been authorized by the Canal Board. The value of work done during the year is \$162,020, total done to date, \$393,990. The amount paid on extra work orders during the year is \$1,263.23, total to date, \$1,373.67.

Gordon Edson, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board July 11, 1917, provides for flattening side slopes, changing type of bank construction, changing location of snubbing-posts, eliminating certain ladders, protecting slopes with riprap and changing construction at stream entrances. It increases the contract price by \$37,546.85.

Alteration No. 2, approved by the Canal Board March 27, 1918, provides payment for additional coffer-dams, pumping, bailing and draining. It increases the contract price by \$6,000.00.

An extra work order dated November 22, 1917, provides for driving a row of sheet-piling and maintaining a channel to provide drainage from the contract. The final account, amounting to \$1,263.23, was approved by the Canal Board March 13, 1918.

An extra work order dated January 2, 1918, provides for removing a small amount of material at the east end of contract No. 6, placing timber fenders on guide-piers along east approach to guard-lock, and grouting track rails at the guard-lock.

An extra work order dated June 28, 1918, provides for a shelter for the lock-tender at the guard-lock.



WORK AT THE PENNSYLVANIA RAILROAD BRIDGE, SPUR LINE, OVER THE BARGE CANAL
The bridge carries a single track. The view was taken about two months before the opening of navigation and shows the finishing of work in this vicinity.

Three steam-shovel plants with locomotives and car equipment were in continuous operation until November 1, 1917, at which time the heavy excavation was completed, excepting at the terminal crossing of the Pennsylvania railroad. The delay of the railroad company in completing this bridge and removing the temporary tracks delayed work at this railroad crossing for more than a month. Two steam-shovels started removing the material at the terminal crossing about the middle of December and worked continuously until about February 15, when they closed down on account of inability to unwater the cut. This condition was brought about by continuous high water in the river and consequently operations were not resumed until the latter part of March. The general excavation at this point was completed the first week in May, at which time the construction tracks in the bottom were removed.

The trimming of the earth slopes was completed during the year by means of a traveling excavator equipped with a drag-line bucket. The concrete retaining walls between the guard-lock and Scottsville road were started in October and carried on until the middle of January, when work was suspended on account of cold weather. This work was resumed in April and completed during the month of May.

Stream entrances were constructed at various points, as designated, and all have been completed.

Contract No. 170

This contract is for constructing a junction lock and completing the canal prism excavation and incidental work at South Greece. It was awarded to Cleveland & Sons Company, being signed on November 10, 1917. The engineer's preliminary estimate was \$54,800.50, the contractor's bid, \$64,588.50. The contract price as modified by alteration No. 1 is \$64,942.50. The value of work done to date is \$44,060.

A. S. Milinowski, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board March 27, 1918, modifies plan for waste-weir outlet ditch, eliminates the steel sheet-piling at the upper end of the lock and eliminates the

construction of the junction lock-gates. It increases the contract price by \$354.00.

An extra work order dated June 4, 1918, provides for constructing timber platforms to facilitate the operation of balance beams, for constructing a bridge across the lower end of the lock, for excavating pits to close up blind drains and for constructing drainage ditches, payment to be made on the basis of cost plus 15 per cent.

This lock is formed by the construction of head-walls to carry the gates at either end. The sides of the chamber are earth slopes protected by wash wall. Three cribs were built on one side of the chamber to serve as a guide for boats, and a plank walk five feet wide extends along the same side of the chamber, connecting the two head-walls and the cribs. This contract also includes the construction of a waste channel from a spillway in the new canal near the head of this lock to a culvert under the old canal.

The lock was ready for navigation on May 15 and a channel had been opened through the dike across the main canal. The wall of the waste channel has been completed and part of this channel has been excavated.

Contract No. 162

This contract provides for constructing a drain across the canal at Main street, Brockport. It was awarded to Charles A. Ingersoll, being signed on March 27, 1917. Construction work began March 22, 1917. The engineer's preliminary estimate was \$6,173.90, the contractor's bid, \$7,273.90. The contract price as modified by alteration No. 1 is \$7,208.30. Excess Portland cement sidewalk, rebuilt, to the value of \$50.00 has been authorized by the Canal Board. The work was accepted August 1, 1917, and the final account, amounting to \$6,455.72, was approved by the Canal Board August 15, 1917.

A. S. Milinowski, Assistant Engineer, was in charge.

The contract work was completed last year, but had not been formally accepted at the close of the fiscal year.

Contract No. 172

The portion of this contract affecting this residency is for furnishing and delivering at Rochester 10 barrel buoys and 4 lamp-posts for aids to navigation in the Genesee river. It was awarded to Lupfer and Remick, being signed on March 15, 1918. The engineer's preliminary estimate for the whole contract was \$14,853.00, the contractor's bid, \$13,063.20. The contract price as modified by alteration No. 1 is \$12,921.45. The value of work done to date on this section is \$590. The amount paid on extra work orders during the year is \$906.50, of which amount \$49.00 applies to work on this residency.

N. R. McLoud, Junior Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board May 23, 1918, eliminates the requirements for galvanizing the barrel hoops. It decreases the contract price by \$141.75.

The barrel buoys were delivered on this section, but the lamp-posts were sent to Tonawanda.

Railroad Crossings

N. Y. C. R. R., Auburn Branch. The superstructure has been completed and painted. The old masonry was removed by May 1, 1918.

West Shore R. R. The superstructure was completed about August 1, 1917.

Pennsylvania R. R., Terminal Branch. Backfilling behind the abutments was finished. The false work was put up and the superstructure erected, pinned and bolted during July, 1917. Rivetting was completed about October 6. Tracks had been laid and ballasted and traffic was turned over the bridge on November 12. The temporary bridge was removed about December 19, 1917.

N. Y. C. R. R., Main Line. The excavation under the tracks was completed during August, 1917.

Senior Assistant Engineer A. R. Morse reports:

The portion of this residency in my charge comprises contracts Nos. 59, 59-A, 138 and 144, terminal contracts Nos. 48 and 57,

Genesee street sewer overflows Nos. 1 and 2, and the Clarissa street bridge and approaches. There are four railroad crossings within this portion of the residency — the Erie crossing of the Genesee river south of Clarissa street, the Erie and Lehigh Valley crossings of the Barge canal in Genesee Valley park and the Pennsylvania (main line) crossing of the Barge canal west of the Genesee river.

Many conditions on this residency have required special study and treatment. The canal passes through Genesee Valley park and in order that the usefulness of the park should not be impaired the State has had to adjust existing conditions to canal requirements. The use of Genesee river for harbor purposes has, under the plan adopted, required the raising of the water-surface and this has necessitated the adjustment of certain city sewers, the raising of the Elmwood avenue bridge, the rebuilding of the Clarissa street bridge, the construction of over two miles of wall along the banks and the construction of a dam. The Lehigh Valley yards have also required adjustment to afford land for the canal terminal.

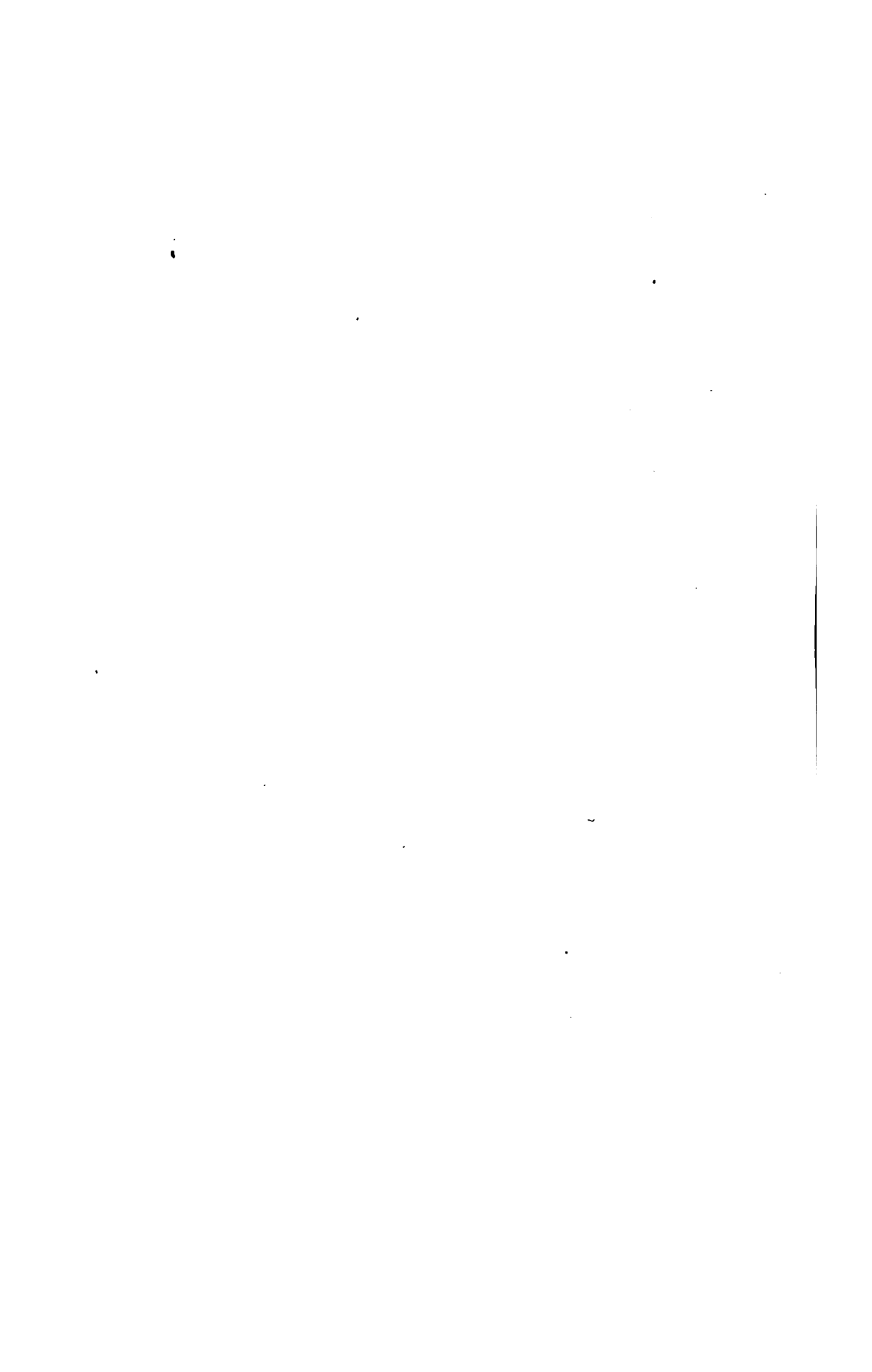
The city sewers are to be adjusted by the City. The Elmwood avenue bridge has been raised by the State. The Clarissa street bridge is to be rebuilt by the City, the State to pay for its share of the work, the new bridge being larger than the State would be required to build. The retaining walls along the river are being built by the State, necessary interference with railroad tracks and traffic having been provided for by agreements with the railroads. In order to afford flood protection, these walls are being built higher than is necessary for canal purposes. The cost of this additional height is borne by the City, according to agreement. The dam is being built by the State, an agreement having been reached with the power owners whereby the canal purposes are served and the power rights are disturbed as little as possible.

Considerable study was made of the Lehigh Valley railroad yard and an agreement was reached for a rearrangement of this yard on the basis of facilities equal to those possible under present conditions, the State to furnish certain lands to the east of the present tracks and the railroad company to move the tracks.



PRISM EXCAVATION IN GENESEE VALLEY PARK, ROCHESTER

A view taken about two months before navigation was opened. Just beyond the excavating machines are seen the abutments of the main drive bridge. The Genesee river crossing is situated at the far end of the stretch of channel shown in the view.



In developing the plans for this work and adjusting the various problems, the purpose has been to secure desirable results as economically as was practicable and to interfere with or injure the rights of others as little as possible.

Surveys and plans are under way for an approach to the Rochester terminal from Court street and South avenue. It is proposed to widen the Court street bridge over the bed of the old canal and build an approach from this bridge to the south, passing under the Lehigh Valley tracks and then rising to the level of the wharf. An agreement has been made with the Lehigh Valley Railroad Co. for the construction of a viaduct over this approach, but construction work has not been started.

Contract No. 59

This contract is for the construction of the canal from the west end of contract No. 23-A to the east end of contract No. 21-A, and the construction of Rochester harbor, between the crossing at Genesee Valley park and a point about 400 feet south of the proposed dam near Court street bridge. It was awarded to MacArthur Brothers Company, being signed on November 3, 1916. Construction work began January 3, 1917. The engineer's preliminary estimate was \$1,675,252.86, the contractor's bid, \$1,596,788.91. The contract price as modified by alterations Nos. 1 and 2 is \$1,603,285.11. The value of work done during the year is \$371,940, total done to date, \$413,460. The amount paid on extra work orders during the year is \$65,523.46, total to date, \$66,023.46.

Arthur S. Whitbeck, Assistant Engineer, is in charge.

Alteration No. 2, approved by the Canal Board December 19, 1917, provides for changing the west river wall at the point of intersection with the city water mains and for filling with embankment certain low places in the feeder banks. It increases the contract price by \$2,006.00.

An extra work order dated September 24, 1917, provides for building a temporary timber movable dam across the Genesee river

at Elmwood avenue. Payments to the amount of \$65,223.46 have been made on this order.

An extra work order dated September 26, 1917, provides for pumping out the pit at the Lehigh Valley crossing. The final account, amounting to \$300.00, was approved by the Canal Board December 19, 1917.

The excavation through the park progressed to such an extent that navigation through this section was opened in May with a channel having a minimum width of 60 feet. Three drag-line machines, two grader outfits and a Thew shovel were used. The main drive bridge, a steel arch, was practically completed. Grading for roads and walks progressed with the excess spoil being deposited in the South meadow. One concrete arch bridge west of the river was completed. The Elmwood avenue bridge was raised and the approaches completed. The river excavation was made with a large Bucyrus drag-line machine and the spoil was deposited along the west bank of the river. Work has progressed on the walls along the east and west sides of the harbor.

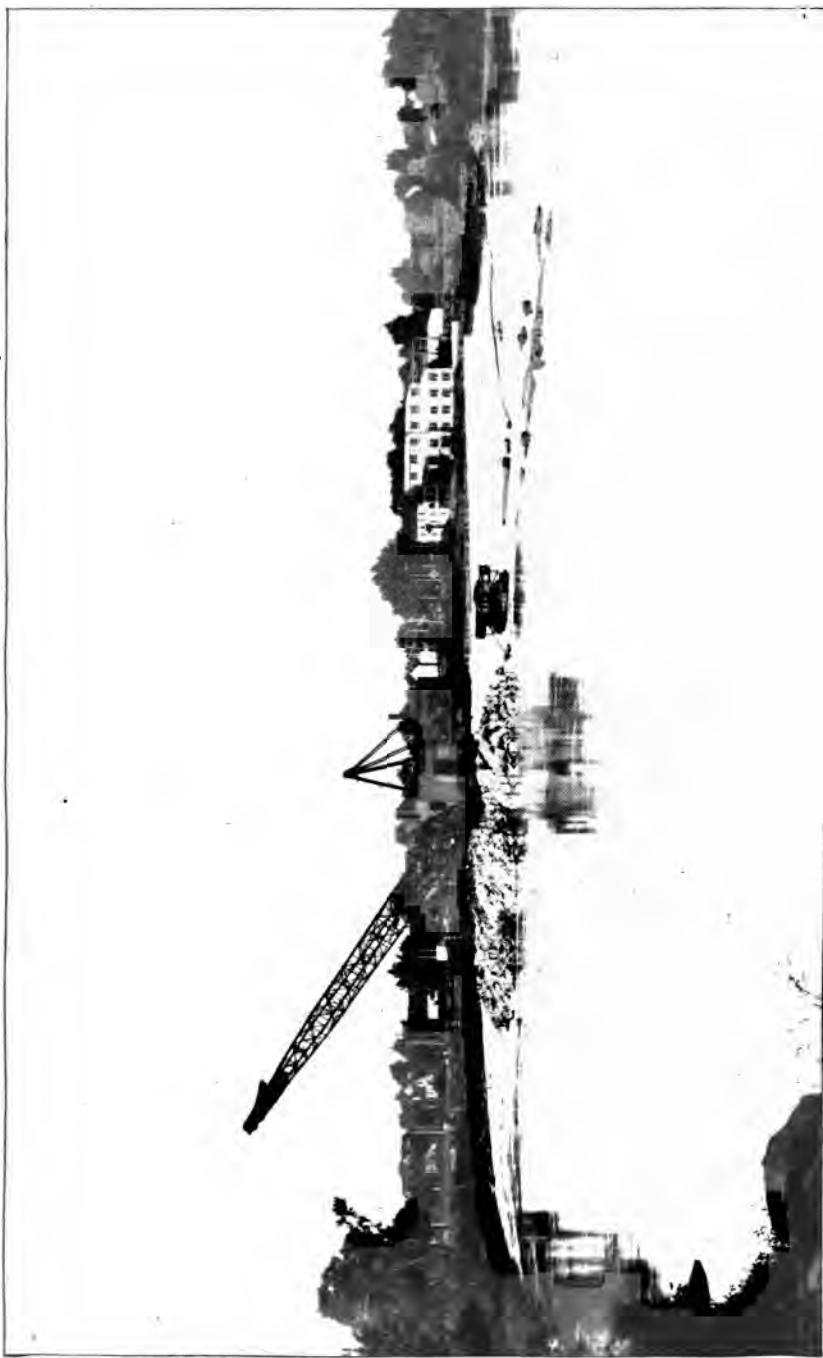
The temporary dam across the Genesee river south of Elmwood avenue was built during the fall and winter months.

Contract No. 59-A

This contract is for the construction of a sewer from Genesee Valley park to a point about 100 feet south of Court street bridge, Rochester. Length, 2.914 miles. It was awarded to P. H. Murray, being signed on July 3, 1916. Construction work began July 20, 1916. The engineer's preliminary estimate was \$124,260.55, the contractor's bid, \$110,689.45. The value of work done during the year is \$38,857. On December 4, 1917, the Canal Board accepted the work and approved the final account, which amounted to \$109,996.85. The amount paid on extra work orders during the year is \$34.00, total to date, the same.

J. S. Summers and W. W. Brown, Assistant Engineers, were successively in charge.

The work was completed during the fall and early winter months of 1917.



EXCAVATION IN THE GENESSEE RIVER NEAR BROOKS AVENUE, ROCHESTER
The canalized Genesee furnishes navigation from the main canal line to the center of Rochester.

Contract No. 138

This contract is for constructing a movable dam, bulkheads, retaining wall and incidental work, at Rochester. It was awarded to the Combined Construction Company, being signed on April 19, 1917. Construction work began June 8, 1917. The engineer's preliminary estimate was \$302,700.30, the contractor's bid, \$321,115.12. The value of work done during the year is \$19,500, total done to date, \$20,200.

J. S. Summers, Assistant Engineer, is in charge.

The west bulkhead and walls and the west pier of the bridge dam were started and progressed to near completion, when the high water of the spring flood made it necessary to suspend operations. Work was resumed early in June.

Contract No. 144

This contract is for constructing two concrete bridges over Red creek in Genesee Valley park, Rochester. It was awarded to W. F. Martens & Co., Inc., being signed on June 14, 1917. Construction work began June 18, 1917. The engineer's preliminary estimate was \$41,480.70, the contractor's bid, \$41,258.70. The contract price as modified by alteration No. 1 is \$46,208.70. The value of work done during the year is \$5,610, total done to date, \$5,740.

L. G. Fisher, Assistant Engineer, is in charge.

Work has progressed slowly on this contract. A small amount of excavation was done for the abutments of the lower arch bridge. The excavation for the upper bridge is completed, as well as the concrete for the abutments.

Terminal Contract No. 48 — Rochester

This contract provides for constructing a terminal on the east side of the Genesee river at Rochester. It was awarded to Michael H. Ripton, being signed on October 19, 1916. Construction work began November 22, 1916. The engineer's preliminary estimate was \$101,000.00, the contractor's bid, \$93,828.00. The contract has been modified by alteration No. 1,

which made no change in the contract price. The value of work done during the year is \$54,420, total to date, \$79,900.

C. E. Elmendorf, Assistant Engineer, is in charge.

The wall was completed for the 1,500 feet of terminal dock, 3,400 cu. yds. of concrete having been laid during the year. The excavation, embankment and miscellaneous work was completed during the season. Some progress has been made in the final shifting of the Lehigh Valley railroad yards.

Railroad Crossings

The Erie railroad bridge over the Genesee river was completed during the season. At the Erie crossing of the Barge canal east of Genesee Valley park, construction started about October 1, 1917, and the abutments were completed by June 1, 1918. Back-filling of the abutments is practically completed, but the steel has not been placed. The Lehigh Valley bridge over the Barge canal was in place and riveted prior to June 30, 1917. The metal reinforcement and the concrete floor for both tracks was placed during July, 1917, and the bridge was thrown open to traffic on August 24. At the Pennsylvania main line crossing, work started about the middle of August, 1917, and the sub-structure was completed except for the west wing of the south abutment by January 15, 1918. The erection of false work started about May 15. The superstructure has been erected, the lower chord riveted and the false work removed. During the erection of this structure the traffic of this railroad has been diverted over the Erie and the B., R. & P. railroads.

ERIE CANAL, RESIDENCY No. 10-A

Senior Assistant Engineer B. E. Failing reports:

Residency No. 10-A extends from the east line of Orleans county to 100 feet east of Main street bridge in Gasport, a distance of 32.05 miles. Terminal contracts Nos. 39, 54 and 211 have been active during the year. Reports on these contracts follow.

Terminal Contract No. 39 — Albion

This contract is for constructing a terminal at Albion. It was awarded to Fred H. Rhodney, being signed on March 29, 1917. Construction work began in April, 1917. The engineer's preliminary estimate was \$2,700.00, the contractor's bid, \$2,952.50. The value of work done during the year is \$618. The work was accepted December 19, 1917, and the final account, amounting to \$2,718.40, was approved by the Canal Board January 23, 1918.

H. N. Metzger, Assistant Engineer, was in charge.

This terminal is located on the south side of the Barge canal, about 200 feet west of Main street and extends along the canal for a distance of about 330 feet. The contract provides for placing fenders and snubbing-posts on the existing dockwall, clearing and grading the terminal site and placing gravel surfacing over part of the area. Teams and scrapers were used for grading. Additional material for fill was secured from borrow-pits. The work was finished in October, 1917.

Terminal Contract No. 211

This contract is for constructing terminal warehouses at Newark, Albion and Medina. The following report pertains to the work at Albion and Medina. The contract was awarded to W. F. Martens & Co., Inc., being signed on June 4, 1917. The engineer's preliminary estimate for these two warehouses was \$5,800.00 (\$2,800.00 for Albion and \$3,000.00 for Medina), the contractor's bid, \$5,237.00 (\$2,472.00 for Albion and \$2,765.00 for Medina). The value of work done during the year is \$2,891 (\$2,176 at Albion and \$715 at Medina). The work was accepted October 16, 1917, and the final account, amounting to \$7,896.80 for the three houses (\$2,435.80 for Albion and \$2,735.30 for Medina), was approved by the Canal Board January 23, 1918. The amount paid on extra work orders at these two places during the year is \$98.55 (\$48.93 at Albion and \$49.62 at Medina), total to date, the same.

H. N. Metzger, Assistant Engineer, was in charge.

An extra work order dated July 23, 1917, provides for placing wire screens over the windows and doors of the warehouses. The final account, amounting to \$147.48 for the three houses (\$48.93

for Albion and \$49.62 for Medina), was approved by the Canal Board June 12, 1918.

At Albion all the work was done during the year except constructing the foundation, which was placed in June of the previous year.

At Medina the work was completed the previous year with the exception of the painting and electrical work.

Terminal Contract No. 54 — Middleport

This contract is for constructing a terminal at Middleport. It was awarded to the Hammond-Tracy Construction Co., Inc., being signed on March 27, 1917. The engineer's preliminary estimate was \$1,250.00, the contractor's bid, \$1,234.00. The value of work done during the year is \$412. The work was accepted December 19, 1917, and the final account, amounting to \$1,052.25, was approved by the Canal Board January 23, 1918.

H. N. Metzger, Assistant Engineer, was in charge.

The work this year consisted in the placing of the lining only. The other work called for under the contract was finished last year.

ERIE CANAL, RESIDENCY No. 10-B

Senior Assistant Engineer B. E. Failing, reports:

This residency extends from a point about 100 feet east of the Gasport bridge westward to the Sulphur Springs guard-lock, a distance of 11.7 miles. Contract No. 98 and terminal contract No. 210 and portions of Nos. 101 and 106 have been active during the year. Reports on these contracts follow.

Contract No. 98

This contract is for constructing a lift-bridge at Adams street and removing the lift-bridge at Chapel street, Lockport, etc. The contract was awarded to the Tift Construction Co., Inc., being signed on November 24, 1916. The engineer's preliminary estimate was \$77,496.60, the contractor's bid, \$82,276.25. The contract price as modified by alteration No. 1 is \$82,426.25. The value of work done during the year is \$53,440, total to date,

\$73,690. The amount paid on extra work orders during the year is \$500.00, total to date, the same.

H. N. Metzger, Assistant Engineer, is in charge.

Alteration No. 1 eliminates the storage tank provided for the pumping system and provides for installing city water to take the place thereof. It increases the contract price by \$150.00.

An extra work order dated November 7, 1917, provides for a Terrill voltage regulator in the power-house at lock No. 34. The final account, amounting to \$500.00, was approved by the Canal Board June 19, 1918.

An extra work order dated April 29, 1918, provides for embankment in front of the State yards at Lockport, payment to be made on the basis of cost plus 15 per cent.

The work done during the year consisted in finishing the wing-walls and operator's cabin at Adams street and in removing the bridge, coping walls, deepening and widening the canal and doing the necessary grading at Chapel street. The steelwork at Adams street was erected by the Lackawanna Bridge Co. The bridge itself was finished and put in operation at the opening of navigation this year. The contract has been finished with the exception of some work on the approaches.

Terminal Contract No. 210

This contract is for constructing frame warehouses on the upper and lower terminals at Lockport. Each warehouse has a floor space 32 feet by 100 feet. The contract was awarded to the Savage Construction Company, being signed on June 1, 1917. The engineer's preliminary estimate was \$9,955.00, the contractor's bid, \$9,903.00. Excess excavation to the value of \$45.00 has been authorized by the Canal Board. The value of work done during the year is \$5,725. The work was accepted October 23, 1917, and the final account, amounting to \$9,765.00, was approved by the Canal Board December 4, 1917. The amount paid on extra work orders during the year is \$79.48, total to date, the same.

H. N. Metzger, Assistant Engineer, was in charge.

An extra work order dated July 23, 1917, provides for placing wire screens over windows and doors. The final account, amount-

ing to \$79.48, was approved by the Canal Board November 9, 1917.

The warehouse at the upper terminal was painted and the electrical work done this year, the other work being completed the previous year. At the lower terminal, all the work was done this year with the exception of the foundation.

Terminal Contract No. 101

This contract is for furnishing and installing steel stiff-leg derricks on terminal sites at Albany, Whitehall, Little Falls, Rome, Lockport and Tonawanda. The following report relates to the work at Lockport. The contract was awarded to E. Brown Baker, being signed on December 18, 1916. On February 21, 1917, it was assigned to the Mohawk Dredge & Dock Co., Inc., and this assignment was approved by the Superintendent of Public Works March 26, 1917. The engineer's preliminary estimate for the derrick at Lockport was \$3,477.90, the contractor's bid, \$5,028.90. Excess metal (Lockport) to the value of \$966.00 has been authorized by the Canal Board. The value of work done at Lockport during the year is \$5,390.00, total done to date, the same.

This derrick has been installed at the lower terminal. It has a capacity of fifteen tons.

Terminal Contract No. 106

This contract is for furnishing fourteen two-ton steam tractor cranes for Barge canal terminals. One of these is for use at Lockport. The contract was awarded to the John F. Byers Machine Co., being signed on February 14, 1918. The engineer's preliminary estimate was \$5,250.00 per crane, the contractor's bid, \$5,265.00. The contract price as modified by alteration No. 1 is \$5,515.00 per crane. The value of work done at Lockport during the year is \$5,515, done to date, the same.

Alteration No. 1, approved by the Canal Board March 27, 1918, provides for housing the fourteen cranes under this contract. It increases the contract price by \$250.00 per crane.

This crane has been delivered.

ERIE CANAL, RESIDENCY No. 11

Senior Assistant Engineer B. E. Failing reports:

Residency No. 11 extends from the Sulphur Springs guard-lock at Pendleton to and through the city of Buffalo. Contracts Nos. 19-A, 83 and 147, portions of Nos. 172 and 173, terminal contracts Nos. 21, 21-P, 53, 61, 62, 66 and 209 and portions of terminal contracts Nos. 101 and 106 have all been active during the year, excepting terminal contract No. 62, which has been in force only since June 29. Reports on these contracts follow.

Contract No. 19-A

This contract is for redredging, etc., on contract No. 19, from the guard-lock at Sulphur Springs to Tonawanda. It was awarded to H. S. Kerbaugh, Inc., being signed on November 3, 1916. On July 3, 1917, it was assigned to the Empire Engineering Co., Inc., and this assignment was approved by the Superintendent of Public Works August 14, 1917. Construction work began in May, 1917. The engineer's preliminary estimate was \$152,200.00, the contractor's bid, \$169,750.00. The value of work done during the year is \$132,930, total done to date, \$142,820. The amount paid on extra work orders during the year is \$2,520.81, total to date, \$3,980.39.

R. W. Cady, Assistant Engineer, is in charge.

An extra work order dated January 30, 1917, provides for repairing the temporary supports of New Home bridge. The final account, amounting to \$1,947.21, was approved by the Canal Board November 9, 1917.

An extra work order dated August 13, 1917, provides for constructing tile drains for lands in the vicinity of the New Home bridge and Irish road. The final account, amounting to \$604.68, was approved by the Canal Board April 24, 1918.

An extra work order dated March 29, 1918, provides for additional work in excavating foundation of the old north pier of the New Home bridge, and removing piles driven by the Superintendent of Public Works at this place. The final account, amounting to \$1,428.50, was approved by the Canal Board April 24, 1918.

The side slopes along Tonawanda creek and the Barge canal were unstable and in several places had slid into the canal, causing sediment to be deposited above grade. These slides had also caused the failure of the abutments of the New Home bridge and the destruction at several places of the highway along the canal. This contract includes the rebuilding of the New Home bridge and of the highways destroyed, the trimming of the side slopes of the canal and the placing of riprap protection.

The New Home bridge and abutments were completed early this year. A 20-inch hydraulic dredge was put in operation in the fall of 1917 and has excavated in the prism since that time except when work was shut down from the middle of December till the latter part of March. The completion of the contract has been delayed by slides, some of which contained as much as forty or fifty thousand cubic yards of material and in some cases completely blocked the channel.

Under the extra work orders repairs to the temporary supports of the New Home bridge were completed this year, tile drains were laid in lands adjacent to this bridge and Irish road and additional work was done in excavating the foundation of the New Home bridge.

The only work remaining to be done consists in cleaning up the prism and finishing the road at Pendleton.

Contract No. 83

This contract is for completing the canal at Tonawanda and removing a guard-lock and coffer-dam near Sulphur Springs. It was awarded to the Mohawk Dredge and Dock Company, being signed on October 22, 1917. The engineer's preliminary estimate was \$149,604.50, the contractor's bid, \$216,915.00. The contract price as modified by alteration No. 1 is \$216,615.00. The value of work done to date is \$55,200. The amount paid on extra work orders is \$2,700.00.

R. W. Cady, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board November 20, 1917, provides for the use of second-hand steel sheet-piling for the protection of the river pier of the Delaware avenue bridge. It decreases the contract price by \$300.00.

An extra work order dated February 11, 1918, provides for a temporary dam across the old canal just west of Main street, Tonawanda, for maintaining navigation. The final account, amounting to \$2,700.00, was approved by the Canal Board June 12, 1918.

The Tonawanda dam has been removed, a channel 12 feet deep and over 50 feet wide has been excavated to Tonawanda, the coffer-dam at Pendleton has been removed and the work of removing the old guard-lock at Pendleton is nearly complete. The work is being done by three derrick-boats, operating clam-shell buckets, and one dipper-dredge. The excavated material has been spoiled in the Government dumping grounds in Niagara river and in the back channels of Tonawanda creek. The steel sheet-piling protection for the river pier of the Delaware avenue bridge has been driven. The temporary dam across the old canal has been finished.

Contract No. 147

This contract is for constructing the substructure, superstructure and approaches of a bascule bridge across Tonawanda creek at Main and Webster streets, Tonawanda and North Tonawanda.

It was awarded to the Scherzer Rolling Lift Bridge Co., being signed on September 10, 1917. On June 5, 1918, it was assigned to Lathrop, Shea & Henwood Co., and this assignment was approved by the Superintendent of Public Works July 1, 1918. Construction work began in October, 1917. The engineer's preliminary estimate was \$227,032.80, the contractor's bid, \$223,986.30. The value of work done to date is \$30,530. The amount paid on extra work orders is \$3,644.50.

R. W. Cady, Assistant Engineer, is in charge.

An extra work order dated November 27, 1917, provides for driving 22 arch-web steel sheet-piles alongside the outside wooden piles for the temporary timber highway bridge. The final account, amounting to \$2,975.00, was approved by the Canal Board June 5, 1918.

An extra work order dated April 29, 1918, provides for transporting and driving steel sheet-piling to protect the existing

structure back of the north abutment. The final account, amounting to \$660.50, was approved by the Canal Board June 5, 1918.

The temporary bridge for carrying traffic around the new structure was finished, the north abutment has been built up to an elevation above the water line and the construction of the cofferdam for the south abutment has been started. The work under the two extra work orders has also been finished. Considerable delay has resulted from the difficulty of securing timbers for coffer-dams.

The work has been done by Lathrop, Shea & Henwood Co., subcontractors, up to the date of assignment.

Contract No. 172

The portion of this contract affecting this residency is for furnishing and delivering 40 red and 40 black barrel buoys and 15 red and 15 black lamp-posts at Tonawanda. It was awarded to Lupfer & Remick, being signed on March 15, 1918. The engineer's preliminary estimate for the whole contract was \$14,853.00, the contractor's bid, \$13,063.20. The contract price as modified by alteration No. 1 is \$12,921.45. The value of work done to date on this residency is \$5,540. The amount paid on extra work orders is \$392.00.

R. W. Cady, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board May 23, 1918, eliminates the requirement for galvanizing the barrel hoops. It decreases the contract price by \$141.75.

An extra work order dated April 4, 1918, provides for concrete anchors for buoys. The final account, amounting to \$906.50 (\$292.00 for this residency), was approved by the Canal Board June 27, 1918.

Eighty barrel buoys, with mooring cable, and thirty-four lamp-posts were delivered at Tonawanda about the time the canal was opened for navigation this year.

Contract No. 173

The portion of this contract affecting this residency is for furnishing and delivering at Tonawanda 140 oil-burning lanterns for buoy, stake and bridge lights on the Tonawanda river. It

was awarded to R. B. Wing & Son, being signed on February 9, 1918. The engineer's preliminary estimate was \$19.00 per lantern, or \$2,660.00 for this residency, the contractor's bid, \$17.92 per lantern, or \$2,508.80 for this residency. On June 26, 1918, the Canal Board accepted the work and approved the final account, the amount being the same as the contractor's bid.

R. W. Cady, Assistant Engineer, was in charge.

These lanterns were delivered at about the time the canal was opened for navigation this year.

Terminal Contract No. 209

This contract is for constructing frame warehouses at Tonawanda and North Tonawanda. It was awarded to G. J. & P. L. Metzger, being signed on June 4, 1917. Construction work began in June, 1917. The engineer's preliminary estimate was \$7,892.00, the contractor's bid, \$7,535.00. Excess quantities to the value of \$58.50 have been authorized by the Canal Board. The value of work done during the year is \$6,979. The work was accepted October 3, 1917, and the final account, amounting to \$7,459.10, was approved by the Canal Board December 4, 1917. The amount paid on extra work orders during the year is \$83.54, total to date, the same.

R. W. Cady, Assistant Engineer, is in charge.

An extra work order dated July 16, 1917, provides for placing wire screens over the windows and doors of these warehouses. The final account, amounting to \$83.54, was approved by the Canal Board November 9, 1917.

The warehouse at Tonawanda has a floor area 32 by 80 feet and the one at North Tonawanda, a floor area 24 by 100 feet. The foundations were finished prior to July 1, 1917, but all the other work has been done since that time. The contract was completed in August of 1917.

Terminal Contract No. 101

This contract is for furnishing and installing steel stiff-leg derricks on terminal sites at Albany, Whitehall, Little Falls, Rome, Lockport and Tonawanda. The following report relates to the derrick at Tonawanda. The contract was awarded to

E. Brown Baker, being signed on December 18, 1916. On February 21, 1917, it was assigned to the Mohawk Dredge & Dock Co., Inc., and this assignment was approved by the Superintendent of Public Works March 26, 1917. The engineer's preliminary estimate for the derrick at Tonawanda was \$3,589.40, the contractor's bid, \$5,140.40. Excess metal (Tonawanda) to the value of \$966.00 has been authorized by the Canal Board. The value of work done at Tonawanda during the year is \$5,330, total done to date, the same.

This derrick has been installed.

Terminal Contract No. 21 — Erie Basin, Buffalo

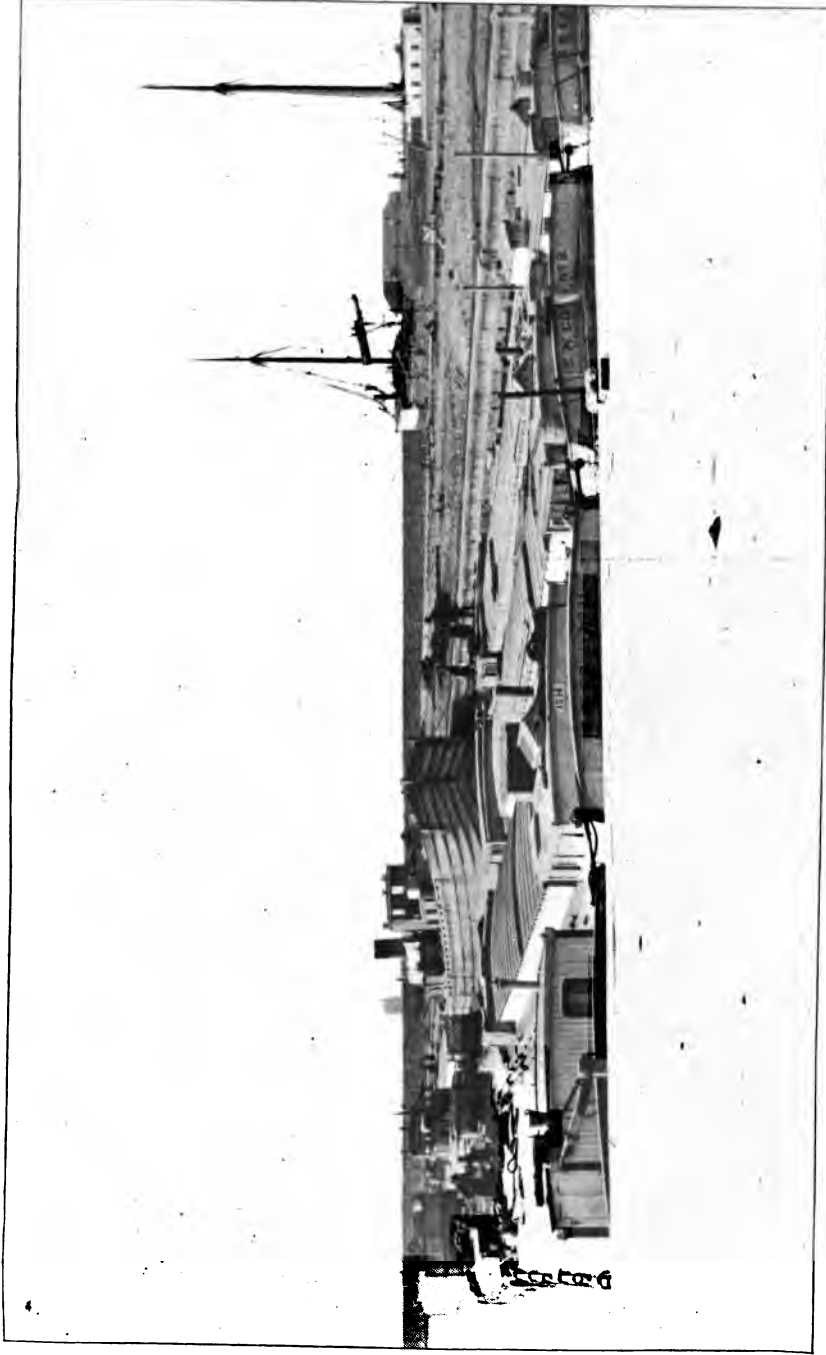
This contract is for constructing a terminal at Erie Basin, Buffalo. It was awarded to H. S. Kerbaugh, Inc., being signed on January 12, 1914. Construction work began in April, 1914. The engineer's preliminary estimate was \$1,513,925.00, the contractor's bid, \$798,605.80. The contract price as modified by alterations Nos. 1 and 2 is \$797,772.30. The value of work done during the year is \$81,940, total done to date, \$642,060.

Elias H. Anderson, Assistant Engineer, is in charge.

Alteration No. 2, approved by the Canal Board March 20, 1918, provides for omitting the lining at the head of the slip and at the margin of the piers. It decreases the contract price by \$4,200.00.

An extra work order dated March 29, 1918, provides for furnishing materials and performing work to construct a sewer and manhole, for placing conduits for electric wires, and also for furnishing and installing a water-main, payment to be made on the basis of cost plus 15 per cent.

The contract provides for excavating, to a depth of 23 feet at mean lake level, the entire area of the Erie basin between the New York State breakwater and the shore line, an area having a width of about 900 feet and extending from the 23-foot channel of the U. S. Government Black Rock harbor improvement south-erly about 2,200 feet to the 23-foot entrance of the Buffalo river; also for the construction of two piers, pier No. 1 with a length



BARGE CANAL TERMINAL AT ERIE BASIN, BUFFALO

The Buffalo terminal is the logical point of transfer not only between lake and canal but also between certain rail lines and canal. Beyond the fleet of canal boats may be seen pier No. 1, at which lies a lake boat discharging a cargo of lumber.

of 600 feet and pier No. 2 with a length of 400 feet, extending from the shore into the basin. These piers are each 150 feet wide and have a clear distance between them of 250 feet. A concrete dockwall is built along the old dock line between the piers and also southerly from pier No. 2 to old canal slip No. 2 and northerly from pier No. 1 to slip No. 3, the entrance to which is widened. All of this is complete with the exception of 60,000 cubic yards of rock excavation. The work during the year consisted in building the steel sheet-piling dockwall along slip No. 3 and completing the backfill at pier No. 2. One dipper-dredge has been working during the year, stripping and removing the rock excavation; one drill-boat, carrying five drills and drilling three-inch holes, has worked three shifts throughout the year, except for the winter months, at which time operations were suspended on account of ice in the harbor.

Terminal Contract No. 21-P

This contract is for paving part of the terminal site at Erie basin, Buffalo. It was awarded to Henry P. Burgard Company, being signed on May 6, 1918. Construction work began in May, 1918. The engineer's preliminary estimate was \$14,180.00, the contractor's bid, \$14,350.00. The value of work done to date is \$370.

Elias H. Anderson, Assistant Engineer, is in charge.

The work done has consisted in grading the site.

Terminal Contract No. 61

This contract is for constructing a railroad track approach to pier No. 1, Erie basin, Buffalo. It was awarded to the Walsh Construction Company, being signed on May 15, 1918. Construction work began in May, 1918. The engineer's preliminary estimate was \$9,720.00, the contractor's bid, \$11,650.00. The value of work done during the year is \$1,470, total done to date, the same.

Elias H. Anderson, Assistant Engineer, is in charge.

During May and June the excavation and grading were completed and rails were delivered, but the contractor has been unable to secure ties.

Terminal Contract No. 62

This contract provides for constructing railroad tracks and crane rails on pier No. 1, Erie basin, Buffalo. It was awarded to the Walsh Construction Company, being signed on May 15, 1918. The engineer's preliminary estimate was \$8,470.00, the contractor's bid, \$11,400.00.

Elias H. Anderson, Assistant Engineer, is in charge.

Rails, switches and bumping posts have been delivered, but the laying of track has been delayed by the lack of ties.

Terminal Contract No. 66

This contract provides for placing riprap along the shore of Erie basin, between slip No. 2 and Lake street, Buffalo. It was awarded to the Empire Engineering Co., Inc., being signed on June 29, 1918. The engineer's preliminary estimate was \$11,850.00, the contractor's bid, \$12,820.00.

Elias H. Anderson, Assistant Engineer, is in charge.

No work has been done.

Terminal Contract No. 53 — Ohio Basin, Buffalo

This contract is for constructing a terminal at Ohio basin, Buffalo. It was awarded to the Walsh Construction Company, being signed on October 27, 1916. Construction work began in June, 1917. The engineer's preliminary estimate was \$571,800.00, the contractor's bid, \$532,584.00. The contract price as modified by alteration No. 1 is \$597,984.00. The value of work done during the year is \$57,280, total done to date, \$68,370.

Elwin G. Speyer, Assistant Engineer, is in charge.

Alteration No. 1, approved by the Canal Board July 24, 1917, provides for changing the type of dockwall; for substituting third-class for second-class concrete; increasing the height of dockwall around the basin; improving Lackawanna slip by constructing dockwalls, dredging, etc., closing and unwatering Ohio basin during the navigation season; and for changing the design of mooring cleats on the dockwalls. It increases the contract price by \$65,400.00.

An extra work order dated May 21, 1917, provides for installing a 50-kw. Buffalo General Electric Co.'s line panel, etc., at a lump sum price of \$450.00.

The basin has been dredged to a depth of about 17 feet, but no excavation has been made in Dead creek. Steel sheet-piling was driven along the south side of the basin adjacent to the Erie tracks, preparatory to building a concrete retaining wall. The contractor's plant comprises one dipper-dredge with a 5-yard dipper, four dump-scows each having a capacity of 480 cu. yds., one tug, one traveling derrick, one scow, and a floating pile-driver.

The work on the coffer-dam was suspended on October 27, 1917, and on December 14 all contract work was stopped and has not been resumed. The contractor claims that on account of the war he has been unable to get material, supplies and labor.

Terminal Contract No. 106

This contract is for furnishing fourteen two-ton steam tractor cranes for Barge canal terminals. Two of these are for Buffalo and one for Tonawanda. The contract was awarded to the John F. Byers Machine Co., being signed on February 14, 1918. The engineer's preliminary estimate was \$5,250.00 per crane, the contractor's bid, \$5,265.00 per crane. The contract price as modified by alteration No. 1 is \$5,515.00 per crane. One monthly estimate, amounting to \$5,515.00, has been rendered for the work on this residency, on account of the crane at Tonawanda.

Alteration No. 1, approved by the Canal Board March 27, 1918, provides for housing the fourteen cranes under this contract. It increases the contract price by \$250.00 per crane.

One crane has been delivered at Tonawanda and one at Buffalo. The other crane for Buffalo has been delivered at Rochester.

CONCLUSION

While construction conditions have been considerably affected by the war, the engineers have also had their difficulties. A number of valuable men having left the department, those who remained, though greatly reduced in numbers, have taken care of the increased work and are entitled to considerable credit.

I wish to thank these men in this division for the excellent ability and energy they have shown and for their coöperation in the work. I also wish to acknowledge the interest and support of the State Engineer, Frank M. Williams, and of the Special Deputy State Engineer, D. B. La Du, who have personally inspected the work many times and been constantly in touch with its progress, and through whose efforts the opening of the canal for navigation last spring was made possible.

A statement of the engineering expenses of the division follow.

Respectfully submitted,

F. P. WILLIAMS,

Division Engineer.

WESTERN DIVISION: ENGINEERING EXPENSES 249

THE FOLLOWING STATEMENTS SHOW THE NAME, RANK AND COMPENSATION OF ENGINEERS IN THE WESTERN DIVISION OF THE DEPARTMENT OF THE STATE ENGINEER AND SURVEYOR, TOGETHER WITH INCIDENTAL EXPENSES FOR THE FISCAL YEAR ENDED JUNE 30, 1918.

Ordinary Repairs to Canals—Erie Canal

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
F. P. Williams	Division engineer	\$4,800 per year	\$4,800 00	\$538 32	\$5,338 32
Waldo G. Wildes	Senior assistant engineer	3,300 per year	2,732 26		2,732 26
Anna M. Lorscheider	Stenographer	1,500 per year	1,462 50		1,462 50
L. John Long	Junior assistant engineer	1,320 per year	17 74		17 74
E. Quans	Office assistant	1,020 per year	85 00		85 00
Lewis Van Allen	Laborer	2 50 per day	2 50		2 50
			\$9,100 00	\$538 32	\$9,638 32
<i>Incidental Expenses</i>					
Stationery and printing				\$28 00	
Livery				11 50	
Postage				14 86	
Office rent				40 00	
Telephone and telegraph				98 25	
Miscellaneous				169 07	
					361 68
Total					\$10,000 00

Construction of Barge Canal—Erie Canal

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
Waldo G. Wildes	Senior assistant engineer	\$3,300 per year	\$275 00	\$53 29	\$328 29
B. E. Failing	Senior assistant engineer	3,300 per year	1,467 50	85 55	1,553 05
L. S. Hulburd	Senior assistant engineer	3,300 per year	2,774 00	83 25	2,857 25
A. R. Morse	Senior assistant engineer	3,060 per year	2,840 00	41 50	2,881 50
A. E. Steere	Senior assistant engineer	3,300 per year	3,080 00	130 57	3,210 57
Lewis A. Keil	Cashier	2,100 per year	2,025 00	5 08	2,030 08
Frank V. Searls	Estimate clerk	1,920 per year	1,415 51		1,415 51
Edith Schoelles Fogle	Stenographer	999 96 per year	416 65		416 65
W. D. Gartland	Stenographer	1,200 per year	1,200 00		1,200 00
Lucy Leverich	Stenographer	900 per year	41 13		41 13
Mary MacArthur	Stenographer	1,200 per year	200 00		200 00
M. Agnes Maloney	Stenographer	900 per year	75 00		75 00
Victor M. O'Neill	Stenographer	999 96 per year	489 23		489 23
Elizabeth S. White	Stenographer	1,080 per year	1,033 31		1,033 31
C. L. Baldwin	Assistant engineer	2,580 per year	2,440 00	126 79	2,566 79
D. E. Bellows	Assistant engineer	2,580 per year	2,520 00	738 18	3,258 18
W. W. Brown	Assistant engineer	2,160 per year	2,115 00	183 80	2,298 80
R. W. Cady	Assistant engineer	2,580 per year	2,297 32	810 70	3,108 02
R. D. Cameron	Assistant engineer	2,160 per year	2,115 00		2,115 00
C. R. De Graff	Assistant engineer	2,580 per year	1,021 35	25 10	1,046 45
Gordon Edson	Assistant engineer	2,580 per year	2,440 00	13 50	2,453 50
C. E. Elmendorf	Assistant engineer	2,580 per year	1,118 94	5 60	1,124 54
L. G. Fisher	Assistant engineer	2,340 per year	2,263 00	22 70	2,285 70
H. A. Helling	Assistant engineer	1,980 per year	292 74	11 90	304 64
F. W. Madigan	Assistant engineer	2,580 per year	2,330 43	641 52	2,971 95
Frank T. Marsh	Assistant engineer	2,340 per year	2,195 06		2,195 06
H. N. Metager	Assistant engineer	2,340 per year	1,060 69	234 75	1,315 44
A. S. Milinowski	Assistant engineer	2,580 per year	1,918 75	104 87	2,023 62
Lester P. Slade	Assistant engineer	2,160 per year	2,115 00		2,115 00
Elwin G. Speyer	Assistant engineer	2,340 per year	220 42	126 50	346 92
J. Seward Summers	Assistant engineer	2,580 per year	1,944 32	59 51	2,003 83
Arthur S. Wh. ibeck	Assistant engineer	2,580 per year	2,513 50	53 22	2,566 72

Construction of Barge Canal — Erie Canal — (Continued)

Chapter 147, Laws of 1903, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
F. J. Wilbur	Assistant engineer	\$2,580 per year	\$1,554 84		\$1,554 84
R. W. Anderson	Junior assistant engineer	1,440 per year	1,370 00		1,370 00
E. C. Ansel	Junior assistant engineer	1,800 per year	1,291 71	\$25 50	1,317 21
David Arbelt	Junior assistant engineer	1,200 per year	506 45		506 45
Morris Berkenblit	Junior assistant engineer	1,110 per year	234 33		234 33
David L. Breinin	Junior assistant engineer	1,200 per year	280 00		280 00
H. A. Brown	Junior assistant engineer	1,320 per year	1,001 33		1,001 33
Wm. F. Burke	Junior assistant engineer	1,320 per year	1,173 00		1,173 00
W. J. Burns	Junior assistant engineer	1,800 per year	1,711 94		1,711 94
A. B. Chappell	Junior assistant engineer	1,680 per year	1,610 00		1,610 00
E. A. Close	Junior assistant engineer	1,560 per year	628 57		628 57
Clarence M. Colony	Junior assistant engineer	1,560 per year	1,383 98	9 55	1,393 53
J. F. Cullen	Junior assistant engineer	1,200 per year	890 83		890 83
Thomas L. Curtin	Junior assistant engineer	1,200 per year	362 10		362 10
Earle E. R. Dornbeck	Junior assistant engineer	1,320 per year	900 30		900 30
Philip Drabkin	Junior assistant engineer	1,200 per year	361 60		361 60
Walter G. Dubey	Junior assistant engineer	1,320 per year	3 55		3 55
John J. Dunne	Junior assistant engineer	1,320 per year	1,227 50		1,227 50
J. R. Eckhardt	Junior assistant engineer	1,680 per year	1,650 00		1,650 00
J. Frank Egan	Junior assistant engineer	1,320 per year	859 68		859 68
Fred C. Faer	Junior assistant engineer	1,800 per year	1,730 00		1,730 00
Joseph Friedman	Junior assistant engineer	1,200 per year	1,116 13		1,116 13
George Fuller	Junior assistant engineer	1,800 per year	684 85	4 90	689 75
L. P. M. Gaylord	Junior assistant engineer	1,200 per year	333 33		333 33
W. H. Ginity	Junior assistant engineer	1,800 per year	1,621 45		1,621 45
G. J. Goets	Junior assistant engineer	1,200 per year	287 09		287 09
W. B. Green	Junior assistant engineer	1,440 per year	1,290 00		1,290 00
Charles E. Heydt	Junior assistant engineer	1,320 per year	46 13		46 13
Joseph W. Howe	Junior assistant engineer	1,560 per year	1,490 00		1,490 00
H. A. Ingersoll	Junior assistant engineer	1,560 per year	287 74		287 74
Max Jasper	Junior assistant engineer	1,200 per year	390 54		390 54
Edward J. Kelley	Junior assistant engineer	1,320 per year	1,250 00		1,250 00
Fred. G. Kimball	Junior assistant engineer	1,440 per year	1,388 00	12 66	1,398 66
Louis Koteras	Junior assistant engineer	1,320 per year	667 86		667 86
Michael Kovar	Junior assistant engineer	1,320 per year	1,227 50		1,227 50
J. F. Larney	Junior assistant engineer	1,200 per year	760 00		760 00
L. John Long	Junior assistant engineer	1,320 per year	1,272 26	220 73	1,492 99
F. B. McLean	Junior assistant engineer	1,200 per year	1,070 97		1,070 97
Frank J. McMahon	Junior assistant engineer	1,200 per year	1,200 00		1,200 00
A. Mattison	Junior assistant engineer	1,200 per year	483 33		483 33
S. A. Miller	Junior assistant engineer	1,680 per year	1,540 00		1,540 00
W. R. Miller	Junior assistant engineer	1,440 per year	617 99		617 99
Dana M. Miner	Junior assistant engineer	1,800 per year	1,280 00		1,280 00
C. V. O'Malley	Junior assistant engineer	1,800 per year	493 23	37 28	530 51
Abraham Oster	Junior assistant engineer	1,110 per year	44 75		44 75
O. M. Peavy	Junior assistant engineer	1,200 per year	94 84		94 84
John J. Phalan	Junior assistant engineer	1,320 per year	673 51	2 01	675 52
O. J. Pierce	Junior assistant engineer	1,440 per year	1,410 00		1,410 00
Earl Polmateer	Junior assistant engineer	1,200 per year	347 21		347 21
G. M. Quackenbush	Junior assistant engineer	1,200 per year	713 49		713 49
W. W. Relfern	Junior assistant engineer	1,200 per year	750 75	14 40	765 15
Harry Rubin	Junior assistant engineer	1,200 per year	1,029 11		1,029 11
Daniel Salmow	Junior assistant engineer	1,200 per year	87 10		87 10
M. B. Severance	Junior assistant engineer	1,560 per year	161 03		161 03
D. T. Simpson	Junior assistant engineer	1,680 per year	1,610 00		1,610 00
J. A. Sloat	Junior assistant engineer	1,800 per year	1,770 00	105 83	1,875 83
Jacob Smertenko	Junior assistant engineer	1,200 per year	1,177 50		1,177 50
Tracy B. Smith	Junior assistant engineer	1,800 per year	1,284 67		1,284 67
I. L. Stalker	Junior assistant engineer	1,320 per year	85 17		85 17
C. J. Sullivan	Junior assistant engineer	1,320 per year	660 00		660 00
J. R. Tighe	Junior assistant engineer	1,320 per year	238 45		238 45
H. R. Topping	Junior assistant engineer	1,800 per year	1,325 32	37 46	1,362 78
Edmond A. Weiss	Junior assistant engineer	1,200 per year	966 67		966 67
H. J. Whitman	Junior assistant engineer	1,800 per year	1,730 00		1,730 00
S. E. Whitney	Junior assistant engineer	1,200 per year	825 81		825 81
Oswald R. Whyte	Junior assistant engineer	1,200 per year	378 81		378 81
E. N. Woodward	Junior assistant engineer	1,200 per year	32 26		32 26
W. J. Zabel	Junior assistant engineer	1,680 per year	1,540 00	7 46	1,547 46
Charles R. Zorsch	Junior assistant engineer	1,800 per year	1,453 39		1,453 39
Lynn H. Barrows	Engineering assistant	1,080 per year	1,065 00		1,065 00
Edgar M. Birdsell	Engineering assistant	840 per year	469 00		469 00
Ernest Budlong	Engineering assistant	840 per year	36 13		36 13
E. J. Bullis	Engineering assistant	960 per year	144 52		144 52

Construction of Barge Canal—Erie Canal—(Continued)

Chapter 147, Laws of 1917, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
Harry Coniff.....	Engineering assistant.....	\$1,020 per year	\$837 56		\$837 56
E. J. Greiner.....	Engineering assistant.....	960 per year	808 30		808 30
F. G. Hempel.....	Engineering assistant.....	1,020 per year	990 83	\$327 85	1,318 68
P. M. Howe.....	Engineering assistant.....	960 per year	168 00		168 00
H. F. Kinney.....	Engineering assistant.....	960 per year	472 52		472 52
Solomon Leibowitz.....	Engineering assistant.....	840 per year	177 33		177 33
W. F. Lysett.....	Engineering assistant.....	1,080 per year	1,006 00		1,006 00
Edward J. Moran.....	Engineering assistant.....	840 per year	20 32		20 32
J. E. Morrell.....	Engineering assistant.....	960 per year	318 06	5 68	323 74
F. J. O'Connor.....	Engineering assistant.....	1,080 per year	1,065 00		1,065 00
L. T. Phillips.....	Engineering assistant.....	1,020 per year	204 00		204 00
Joseph J. Raduciner.....	Engineering assistant.....	840 per year	28 00		28 00
M. M. Seidman.....	Engineering assistant.....	840 per year	180 50		180 50
Frank M. Sisson.....	Engineering assistant.....	1,020 per year	376 19		376 19
R. R. Stevens.....	Engineering assistant.....	840 per year	195 09		195 09
Hugh J. Weir.....	Engineering assistant.....	1,020 per year	622 76		622 76
H. B. Finan.....	Inspector of engineering works.....	1,560 per year	1,178 67		1,178 67
George M. Harter.....	Inspector of engineering works.....	1,560 per year	1,500 72		1,500 72
C. M. Leet.....	Inspector of engineering works.....	1,560 per year	712 90		712 90
James Sim.....	Inspector of engineering works.....	1,560 per year	1,560 00		1,560 00
W. A. Walter.....	Inspector of engineering works.....	1,560 per year	1,560 00		1,560 00
H. Kimball Benedict.....	Boatman.....	3 00 per day	561 00		561 00
W. A. Bright.....	Boatman.....	3 00 per day	529 00		529 00
Carl F. Doty.....	Boatman.....	3 00 per day	75 00		75 00
Edgar W. Fennie.....	Boatman.....	3 00 per day	3 00		3 00
Ernest F. Hamilton.....	Boatman.....	3 00 per day	943 00		943 00
John Hano.....	Boatman.....	3 00 per day	18 00		18 00
Samuel Kaiser.....	Boatman.....	3 00 per day	108 00		108 00
Arthur Knapp.....	Boatman.....	3 00 per day	725 50		725 50
C. Kumro.....	Boatman.....	3 00 per day	942 00		942 00
J. H. McCabe.....	Boatman.....	3 00 per day	945 00		945 00
M. McConnell.....	Boatman.....	3 00 per day	363 00		363 00
David R. Petrikin.....	Boatman.....	3 00 per day	66 00		66 00
John Riley.....	Boatman.....	3 00 per day	930 00		930 00
Richard Stanton.....	Boatman.....	3 00 per day	951 00		951 00
Frank W. Wadley.....	Boatman.....	3 00 per day	593 00		593 00
Freeman S. Barclay.....	Laborer.....	2 50 per day	560 00		560 00
Wm. A. Brick.....	Laborer.....	2 50 per day	787 50		787 50
Paul Buck.....	Laborer.....	2 50 per day	280 00		280 00
M. J. Connolly.....	Laborer.....	2 50 per day	530 00		530 00
Sidney Z. Davidson.....	Laborer.....	2 50 per day	25 00		25 00
H. J. Fisk.....	Laborer.....	2 50 per day	272 50		272 50
John F. Gilbert.....	Laborer.....	2 50 per day	652 50		652 50
Ralph Whitney Gonnell.....	Laborer.....	2 50 per day	22 50		22 50
Raymond J. Golding.....	Laborer.....	2 50 per day	715 00		715 00
Francis E. Green.....	Laborer.....	2 50 per day	127 50		127 50
Smith Hulburt.....	Laborer.....	2 50 per day	877 50		877 50
Henry J. Killian.....	Laborer.....	2 50 per day	777 50		777 50
Edwin Krapf.....	Laborer.....	2 50 per day	542 50		542 50
Lester Lavine.....	Laborer.....	2 50 per day	905 00		905 00
Raymond M. Lynd.....	Laborer.....	2 50 per day	160 00		160 00
Edward F. Murr.....	Laborer.....	2 50 per day	852 50		852 50
G. A. Nusbaum.....	Laborer.....	2 50 per day	165 00		165 00
Leo Palmisano.....	Laborer.....	2 50 per day	162 50		162 50
B. D. Patterson.....	Laborer.....	2 50 per day	372 50		372 50
Raymond J. Quandt.....	Laborer.....	2 50 per day	580 00		580 00
Carlton F. Reule.....	Laborer.....	2 50 per day	205 00		205 00
Matthew Rigney.....	Laborer.....	2 50 per day	62 50		62 50
Raymond J. Riley.....	Laborer.....	2 50 per day	860 00		860 00
George D. Rivera.....	Laborer.....	2 50 per day	335 00		335 00
W. H. Rundie.....	Laborer.....	2 50 per day	387 50		387 50
James Spillman.....	Laborer.....	2 50 per day	135 00		135 00
Elmer R. Stoll.....	Laborer.....	2 50 per day	550 00		550 00
James A. Sullivan.....	Laborer.....	2 50 per day	32 50		32 50
Sydney W. Towe.....	Laborer.....	2 50 per day	150 00		150 00
Lewis Van Allan.....	Laborer.....	2 50 per day	790 00		790 00
E. R. Weed.....	Laborer.....	2 50 per day	585 00		585 00
John Zingierski.....	Laborer.....	2 50 per day	10 00		10 00
John J. Nugent.....	Chauffeur.....	1,500 per year	1,400 00	139 86	1,539 86
E. Quans.....	Office assistant.....	1,020 per year	924 03		924 03
J. Horton Begy.....	Gage reader.....	120 per year	120 00		120 00
H. K. Compeon.....	Gage reader.....	84 per year	84 00		84 00

Construction of Barge Canal—Erie Canal—(Concluded)

Chapter 147, Laws of 1917, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
C. H. Harrison	Gage reader	\$60 per year	\$60 00		\$60 00
Patrick J. Slavin	Gage reader	60 per year	60 00		60 00
Homer Seall	Gage reader	72 per year	72 00		72 00
Carl Tuscher	Gage reader	60 per year	60 00		60 00
			\$151,598 73	\$4,500 00	\$156,107 73
<i>Incidental Expenses</i>					
Instruments and tools				\$58 42	
Office rent				4,314 50	
Fuel and light				156 01	
Stationery and printing				163 71	
Postage				378 29	
Telephone and telegraph				1,372 12	
Miscellaneous				9,017 77	
					15,458 82
Total					\$171,566 55

Construction of Barge Canal Terminals

Chapter 746, Laws of 1911, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
B. E. Failing	Senior assistant engineer	\$3,300 per year	\$1,467 50	\$89 60	\$1,557 10
L. S. Hulburd	Senior assistant engineer	3,060 per year	306 00		306 00
F. V. Searls	Estimate clerk	1,920 per year	268 22		268 22
Edith S. Fogle	Stenographer	999 96 per year	294 15		294 15
M. Agnes Maloney	Stenographer	900 per year	75 00		75 00
Elias H. Anderson	Assistant engineer	2,580 per year	2,125 40	4 66	2,130 06
R. W. Cady	Assistant engineer	2,208 per year	29 68		29 68
C. E. Elmendorf	Assistant engineer	2,340 per year	959 90	5 00	964 90
H. A. Helling	Assistant engineer	1,980 per year	31 94	6 60	38 54
H. N. Metzger	Assistant engineer	2,340 per year	731 19	131 54	862 73
Elwin G. Speyer	Assistant engineer	2,340 per year	1,152 74	38 90	1,191 64
J. S. Summers	Assistant engineer	2,580 per year	495 68	20	495 88
F. J. Wilbur	Assistant engineer	2,580 per year	860 00		860 00
C. J. Bean	Junior assistant engineer	1,800 per year	1,500 06		1,500 06
E. A. Close	Junior assistant engineer	1,440 per year	594 33		594 33
E. E. R. Dornbach	Junior assistant engineer	1,110 per year	20 89		20 89
Walter G. Dubey	Junior assistant engineer	1,440 per year	1,316 41		1,316 41
W. H. Ginnity	Junior assistant engineer	1,680 per year	38 55		38 55
G. J. Goets	Junior assistant engineer	1,200 per year	48 39		48 39
Charles E. Heydt	Junior assistant engineer	1,320 per year	63 87		63 87
H. A. Ingersoll	Junior assistant engineer	1,560 per year	135 25		135 25
F. B. McLean	Junior assistant engineer	1,200 per year	89 04		89 04
W. R. Miller	Junior assistant engineer	1,440 per year	752 01		752 01
Abraham Oster	Junior assistant engineer	1,200 per year	72 82		72 82
W. W. Redfern	Junior assistant engineer	1,200 per year	371 69		371 69
Daniel Salmow	Junior assistant engineer	1,200 per year	177 20		177 20
M. B. Soverance	Junior assistant engineer	1,560 per year	768 08		768 08
Tracy B. Smith	Junior assistant engineer	1,800 per year	485 33		485 33
I. L. Stalker	Junior assistant engineer	1,440 per year	891 49		891 49
Harry J. Turner	Junior assistant engineer	1,200 per year	219 36		219 36
Oswald R. Whyte	Junior assistant engineer	1,200 per year	211 29		211 29
E. N. Woodward	Junior assistant engineer	1,200 per year	19 35		19 35
Charles R. Zorsch	Junior assistant engineer	1,800 per year	154 67	1 60	156 27
Harry Coniff	Engineering assistant	1,020 per year	116 44		116 44
Edward J. Moran	Engineering assistant	840 per year	11 29		11 29
J. E. Morrell	Engineering assistant	960 per year	276 00		276 00
F. M. Sisson	Engineering assistant	1,020 per year	5 48		5 48
R. R. Stevens	Engineering assistant	840 per year	99 36		99 36

Construction of Barge Canal Terminals — (Continued)

Chapter 746, Laws of 1911, and amendatory laws

NAME	Rank	Rate of compensation	Services	Travel	Total
Hugh J. Weir	Engineering assistant	\$960 per year	\$344 17		\$344 17
George M. Harrer	Inspector of engineering works	1,560 per year	42 36		42 36
C. M. Leet	Inspector of engineering works	1,560 per year	457 10		457 10
Edgar W. Fennie	Boatman	3 00 per day	528 00		528 00
Samuel Kaiser	Boatman	3 00 per day	57 00		57 00
Arthur Knapp	Boatman	3 00 per day	199 00		199 00
C. Kumro	Boatman	3 00 per day	30 00		30 00
J. H. McCabe	Boatman	3 00 per day	39 00		39 00
David R. Petrikin	Boatman	3 00 per day	652 00	\$1 10	653 10
H. Kimball Benedict	Laborer	2 50 per day	10 00		10 00
Paul Buck	Laborer	2 50 per day	62 50		62 50
John I. Carter	Laborer	2 50 per day	242 50		242 50
John R. Davis	Laborer	2 50 per day	347 50		347 50
Francis E. Green	Laborer	2 50 per day	5 00		5 00
H. J. Killian	Laborer	2 50 per day	5 00		5 00
Raymond M. Lynd	Laborer	2 50 per day	17 50		17 50
George D. Rivers	Laborer	2 50 per day	7 50		7 50
W. H. Rundle	Laborer	2 50 per day	392 50		392 50
John Zingierski	Laborer	2 50 per day	270 00		270 00
<i>Incidental Expenses</i>			\$20,944 68	\$279 20	\$21,223 88
Instruments and tools				\$4 00	
Office rent				1,110 00	
Fuel and light				64 37	
Stationery and printing				1 35	
Postage				50 62	
Telephone and telegraph				182 47	
Express and freight				15 62	
Miscellaneous				1,262 39	
					2,690 82
Total					\$23,914 70

Canisteo River Improvement

Chapter 750, Laws of 1913; chapter 728, Laws of 1915; chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
Waldo G. Wildes	Senior assistant engineer	\$3,300 per year	\$17 74	\$5 80	\$23 54
H. R. Topping	Junior assistant engineer	1,800 per year	9 68	5 55	15 23
<i>Incidental Expenses</i>			\$27 42	\$11 35	\$38 77
Livery				\$2 00	
					2 50
Total					\$41 27

Chadakoin River Improvement

Chapter 758, Laws of 1913; chapter 728, Laws of 1915; chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
C. R. DeGraff.....	Assistant engineer.....	\$2,340 per year	\$417 36	\$12 76	\$430 12
Thomas L. Curtin.....	Junior assistant engineer.....	1,320 per year	526 45	26 02	552 47
W. W. Redfern.....	Junior assistant engineer.....	1,200 per year	6 67		6 67
Oswald R. Whyte.....	Junior assistant engineer.....	1,200 per year	36 67	21 39	58 06
Paul Buck.....	Laborer.....	2 50 per day	5 00		5 00
Horace S. Butts.....	Gage reader.....	120 per year	120 00		120 00
<i>Incidental Expenses</i>			\$1,112 15	\$60 17	\$1,172 32
Postage.....				\$1 02	
Miscellaneous.....				8 52	
Total.....					\$1,181 86

Ellicott Creek Improvement

Chapter 624, Laws of 1913; chapter 728, Laws of 1915; chapters 181 and 760, Laws of 1917.

NAME	Rank	Rate of compensation	Services	Travel	Total
H. A. Ingersoll.....	Junior assistant eng'neer.....	\$1,440 per year	\$16 00		\$16 00
Abraham Oster.....	Junior assistant engineer.....	1,110 per year	3 08		3 08
<i>Incidental Expenses</i>			\$19 08		\$19 08
Stationery and printing.....				\$44 60	
Total.....					\$63 68

Hertel Avenue Bridge, Buffalo

Chapter 761, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
Elias H. Anderson.....	Assistant engineer.....	\$2,580 per year	\$116 71	\$5 70	\$122 41
Elwin G. Speyer.....	Assistant engineer.....	2,208 per year	24 53		24 53
C. J. Bean.....	Junior assistant engineer.....	1,800 per year	14 52		14 52
Walter G. Dubey.....	Junior assistant engineer.....	1,440 per year	42 71		42 71
I. L. Stalker.....	Junior assistant engineer.....	1,440 per year	203 34	30	203 64
<i>Incidental Expenses</i>			\$401 81	\$6 00	\$407 81
Stationery and printing.....				\$64 86	
Miscellaneous.....				1 55	
Total.....					\$474 22

Eighteen-Mile Creek Culvert, Lockport

Chapters 181 and 626, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
C. R. DeGraff.....	Assistant engineer.....	\$2,208 per year	\$110 40	\$7 91	\$118 31
H. N. Metzger.....	Assistant engineer.....	2,340 per year	12 58	2 90	15 48
Total.....			\$122 98	\$10 81	\$133 79

Blue Line Surveys

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
H. N. Metzger	Assistant engineer	\$2,208 per year	\$53 42	\$47 70	\$101 12
Elwin G. Speyer	Assistant engineer	2,208 per year	79 74	38 05	117 79
Thomas L. Curtin	Junior assistant engineer	1,110 per year	8 95		8 95
H. A. Ingersoll	Junior assistant engineer	1,560 per year	181 28		181 28
F. B. McLean	Junior assistant engineer	1,200 per year	22 58		22 58
Abraham Oster	Junior assistant engineer	1,110 per year	172 98		172 98
M. B. Severance	Junior assistant engineer	1,440 per year	118 58		118 58
Harry J. Turner	Junior assistant engineer	1,200 per year	82 15		82 15
Oswald R. Whyte	Junior assistant engineer	1,200 per year	16 67		16 67
George M. Harter	Inspector of engineering works	1,560 per year	12 59		12 59
Edward J. Moran	Engineering assistant	840 per year	11 29		11 29
Paul Buck	Laborer	2 50 per day	25 00		25 00
John I. Carter	Laborer	2 50 per day	60 00		60 00
John Zingieraki	Laborer	2 50 per day	60 00		60 00
			\$905 23	\$85 75	\$990 98
<i>Incidental Expenses</i>					
Telephone and telegraph				\$0 40	
Miscellaneous				14 29	
					14 69
Total					\$1,005 67

Surveys for State Court of Claims

Chapter 181, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
B. E. Failing	Senior assistant engineer	\$3,300 per year	\$308 00	\$97 04	\$402 04
Elias H. Anderson	Assistant engineer	2,580 per year	111 37	8 21	119 58
F. W. Madigan	Assistant engineer	2,580 per year	189 57	59 13	248 70
Frank T. Marsh	Assistant engineer	2,208 per year	23 94	14 97	38 91
H. N. Metzger	Assistant engineer	2,340 per year	337 64	15 10	352 74
A. S. Milinowski	Assistant engineer	2,208 per year	36 61	9 60	46 21
Elwin G. Speyer	Assistant engineer	2,340 per year	69 95	45 17	115 12
Arthur S. Whitbeck	Assistant engineer	2,340 per year	6 50	3 15	9 65
C. M. Colony	Junior assistant engineer	1,560 per year	107 02	43 57	150 59
H. A. Ingersoll	Junior assistant engineer	1,560 per year	106 52		106 52
F. G. Kimball	Junior assistant engineer	1,440 per year	24 00		24 00
W. W. Redfern	Junior assistant engineer	1,200 per year	48 39		48 39
M. B. Severance	Junior assistant engineer	1,560 per year	27 86		27 86
Geo. M. Harter	Inspector of engineering works	1,560 per year	4 33		4 33
Oswald R. Whyte	Junior assistant engineer	1,200 per year	39 46		39 46
E. J. Greiner	Engineering assistant	960 per year	2 67		2 67
F. G. Hempel	Engineering assistant	1,020 per year	14 17		14 17
John Riley	Boatman	3 00 per day	15 00		15 00
Paul Buck	Laborer	2 50 per day	15 00		15 00
M. J. Connolly	Laborer	2 50 per day	12 50		12 50
Lewis Van Allan	Laborer	2 50 per day	2 50		2 50
			\$1,500 00	\$295 94	\$1,795 94
<i>Incidental Expenses</i>					
Stationery and printing				\$1 25	
Livery				27 00	
Postage				45 84	
Office rent				55 00	
Telephone and telegraph				70 60	
Miscellaneous				4 37	
					204 06
Total					\$2,000 00

Tonawanda Creek Survey, Batavia

Chapter 453, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
Waldo G. Wildes	Senior assistant engineer	\$3,300 per year		\$4 22	\$4 22
A. B. Milinowski	Assistant engineer	2,340 per year	\$327 64	169 26	496 90
E. C. Ansley	Junior assistant engineer	1,680 per year	354 74	59 65	414 39
William J. Burns	Junior assistant engineer	1,680 per year	18 06		18 06
Louis Koterwas	Junior assistant engineer	1,320 per year	56 77		56 77
Earl Polmateer	Junior assistant engineer	1,200 per year	262 47		262 47
G. M. Quackenbush	Junior assistant engineer	1,200 per year	12 90		12 90
E. M. Birdsell	Engineering assistant	840 per year	42 00		42 00
Francis A. Grownsey	Laborer	2 50 per day	102 50		102 50
<i>Incidental Expenses</i>			\$1,177 03	\$233 13	\$1,410 21
Livery				\$36 00	
Postage				1 09	
Telephone and telegraph				1 05	
Miscellaneous				201 65	
Total					239 79
					\$1,650 00

Study of Route of Improved Erie Canal between Tonawanda and Buffalo

Chapter 743, Laws of 1917

NAME	Rank	Rate of compensation	Services	Travel	Total
Waldo G. Wildes	Senior assistant engineer	\$3,300 per year	\$275 00		\$275 00
R. G. Finch	Chief clerk	4,500 per year		\$28 18	28 18
Lewis A. Keil	Cashier	2,100 per year		4 41	4 41
Frank V. Searis	Estimate clerk	1,920 per year	206 27		206 27
Elias H. Anderson	Assistant engineer	2,580 per year	186 52	2 05	188 57
C. R. DeGraff	Assistant engineer	2,340 per year	777 89	8 01	785 90
C. E. Elmendorf	Assistant engineer	2,340 per year	106 94		106 94
Elwin G. Speyer	Assistant engineer	2,340 per year	400 73	68 60	469 33
F. J. Wilbur	Assistant engineer	2,340 per year	25 16		25 16
E. C. Ansley	Junior assistant engineer	1,680 per year	13 55		13 55
C. J. Bean	Junior assistant engineer	1,800 per year	255 42		255 42
E. A. Close	Junior assistant engineer	1,440 per year	65 81		65 81
Walter G. Dubey	Junior assistant engineer	1,320 per year	7 33		7 33
George Fuller	Junior assistant engineer	1,800 per year	222 41		222 41
H. A. Ingersoll	Junior assistant engineer	1,560 per year	300 16		300 16
Louis Koterwas	Junior assistant engineer	1,320 per year	53 23		53 23
G. M. Quackenbush	Junior assistant engineer	1,200 per year	12 90		12 90
M. B. Severance	Junior assistant engineer	1,560 per year	297 39		297 39
I. L. Stalker	Junior assistant engineer	1,440 per year	230 00		230 00
Harry J. Turner	Junior assistant engineer	1,200 per year	53 33		53 33
Oswald R. Whyte	Junior assistant engineer	1,200 per year	195 41		195 41
Charles R. Zorsch	Junior assistant engineer	1,680 per year	121 94		121 94
E. Quans	Office assistant	1,020 per year	10 97		10 97
C. Kumro	Boatman	3 00 per day	6 00		6 00
David E. Petrikin	Boatman	3 00 per day	6 00		6 00
Paul Buck	Laborer	2 50 per day	5 00		5 00
John I. Carter	Laborer	2 50 per day	45 00		45 00
John Zingieraki	Laborer	2 50 per day	52 50		52 50
<i>Incidental Expenses</i>			\$3,912 86	\$111 25	\$4,024 11
Livery				\$4 00	
Miscellaneous				209 00	
Total					213 00
					\$4,237 11

SUMMARY

The foregoing tables are summarized as follows:

Ordinary Repairs to Canals

1. Erie canal, chapter 181, Laws of 1917.....	\$10,000 00
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Construction of Barge Canal

2. Erie canal, chapter 147, Laws of 1903, and amendatory laws.....	171,566 55
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Construction of Barge Canal Terminals

3. Barge canal terminals, chapter 746, Laws of 1911, and amendatory laws.....	23,914 70
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Special Work

4. Canisteo river improvement, chapter 750, Laws of 1913; chapter 728, Laws of 1915; chapter 181, Laws of 1917.....	41 27
5. Chadakoin river improvement, chapter 758, Laws of 1913; chapter 728, Laws of 1915; chapter 181, Laws of 1917.....	1,181 86
6. Ellicott creek improvement, chapter 624, Laws of 1913; chapter 728, Laws of 1915; chapters 181 and 760, Laws of 1917.....	63 68
7. Hertel avenue bridge, Buffalo, chapter 761, Laws of 1917.....	474 22
8. Eighteen-Mile creek culvert, Lockport, chapters 181 and 626, Laws of 1917..	133 79

Special Surveys

9. Blue line surveys, chapter 181, Laws of 1917.....	1,005 67
10. Surveys for State Court of Claims, chapter 181, Laws of 1917.....	2,000 00
11. Tonawanda creek survey, Batavia, chapter 453, Laws of 1917.....	1,650 00
12. Study of route of improved Erie canal between Tonawanda and Buffalo, chapter 743, Laws of 1917.....	4,237 11
Total.....	<u>\$216,268 85</u>

REPORT OF TESTS

REPORT OF THE LAND BUREAU

REPORT OF TESTS

TESTING LABORATORY — GEOLOGICAL HALL

ALBANY, N. Y., July 1, 1918.

HON. FRANK M. WILLIAMS, *State Engineer and Surveyor*:

Sir.— I have the honor to submit the following report of the testing laboratory of your Department for the fiscal year ended June 30, 1918.

The work of the laboratory continues to grow in variety and interest. The superstructures and apparatus being placed on the new Barge canal terminals have given new materials for inspection. So in addition to the regular testing of cement and concrete materials, which continue to form the bulk of the laboratory work, there have been many other kinds of material submitted for tests and analyses. Some special inspections of conditions of material in the field and in place have added to the extent of the value of the laboratory work.

CEMENT TESTS

The work of testing cement has been not only to test that for use on the work of the Barge canal and the Barge canal terminals but has also been testing for other work under the direction of this Department, the Department of Architecture, and several other State departments. During the year there have been submitted to this laboratory and tested 2,668 samples of cement, representing 148,147 barrels of cement, of which 90.1 per cent were for the State Engineer's Department and 9.9 per cent for the State Architect and other departments. It was found that for promptness of inspection and delivery as well as economy it was advisable to permit shipments frequently to the State Architect and to other State work from some bin of cement which had been tested and accepted for use on Barge canal work. Considerable cement was so shipped under our inspection.

The inspection of cement at the mills has been a large part of the work of this bureau. Such inspection permits the taking of

a smaller proportion of samples to the number of barrels represented. In addition to the saving of time and number of necessary samples, mill inspection prevents the delivery of any cement upon the work except that which has been tested and accepted. Because of these advantages there has been relatively less cement sampled after delivery upon the work this year than for many years past.

Each sample submitted, mixed in the proportion of one part cement to three parts standard quartz sand, was tested for tensile strength at 7- and 28-day periods. In addition to the tests for tensile strength, each lot of samples was given tests for fineness of grinding, for initial and hard sets, for specific gravity and for soundness by means of the steam tests, the normal-water test and the normal-air test. Frequently the cements were completely analyzed and are especially checked for sulphuric anhydride (SO_2) and magnesia (MgO). Considerable compressive-strength testing has also been made on the samples submitted.

The methods used in making the tests and analyses of cements are practically those recommended by the Committee on Cement of the American Society for Testing Materials and adopted by that society as standard. A slight variation from that method is that, instead of using a blended sample for tests for tensile strength, we still use our own method of testing each sample separately for tensile strength. This method has long proven very satisfactory; in fact, by means of it, much poor cement has been discovered which would have stood the tests, had all of the samples of a lot been blended. It has been a special help in securing from the mills a cement that is uniform in quality. This method, however, makes necessary a larger equipment and a more complete system of operation than is necessary under the general method of testing the blended sample. The effort has been made to maintain this complete laboratory with as little expense as possible; and it has been acknowledged that the laboratory and its results are as complete and satisfactory as any laboratory making such large numbers of tests of cement.

The specifications for cement have followed closely for years those recommended by the American Society for Testing Materials, varying from them only in the detail of testing separate samples, rather than a blended sample.

At the end of the 7-day tests, all results obtained on tests of samples of cement proposed for use on Barge canal work are reported to Mr. D. B. La Du, Special Deputy State Engineer, and, if then thought best, are held for the 28-day tests, the lots being accepted or rejected according as the results show that the cement passes or fails to pass the tests. The reports of all tests of cement for all other department work (except Barge canal) are submitted to the Deputy State Engineer, William B. Landredth.

This laboratory has also been making a thorough study of the proposition to substitute compression tests of cement for the present tension tests and it is securing data which will help toward a wise decision on this question.

Of the cement tested and proposed for use, all was Portland cement. The brands represented are about as of recent years. Of the brands tested, 7 were manufactured in New York, 10 in Pennsylvania, 2 in New Jersey and 1 in Ohio.

The method of inspection of cement at the various mills is as follows: When there is to be enough cement to warrant doing so, an inspector is sent to the cement mill to sample cement and inspect shipments. The inspector takes samples from the various parts of the bin or from the conveyor as the cement is being carried to the bin, and each sample is tested in the same way as are the samples taken from cement delivered on the work. The endeavor is to obtain from the sampling and the testing of these samples the "run of the product." As soon as the samples are taken, the inspector places the bin of cement under the seal of this Department and the bin is so sealed that no cement can be added to or taken from it without detection. When the results of the tests have been secured, the reports are made in the usual way, and then, if the cement is accepted, the bin of cement is assigned to the contract which may have placed an order for the cement. When the contractor needs cement, the inspector at the mill breaks the seal on the bin, inspects the loading of the car or cars, seals these with the Department seal and then reseals the bin of cement. A notice of shipment is forwarded to the laboratory. This notice is examined and approved, if correct, and sent to the senior assistant engineer in charge of the contract to which the cement has been assigned. When the car or cars arrive on the work, the seal of the Department must be broken by the senior assistant engineer

in charge or his representative, otherwise the lot of cement must be sampled and tested in the usual way.

SAND TESTS

The thorough examination and tests of the sands and gravels proposed for use on work in the various departments have been continued, and the importance of such tests has frequently been fully demonstrated. It has been found that almost all of the available sand and gravel banks along the line of the canal system have been sampled and tested, but with these it is now necessary to make occasional inspections and tests to ascertain whether or not the quality of the materials from these banks is equal to the samples accepted. Many other banks throughout the state, but not along the canal system, have also been tested. The results of the tests of these materials have also been found to be of value by other State departments.

The tests made are as follows: The sands are examined under the microscope for those elements that give the sand its characteristics. The other tests are for voids, loam, fineness or grading, organic matter and strength — both tensile and compressive — with cement. The latter are made from the sand in its natural condition and also washed; and the cement is a "standard" cement, made by mixing together in the laboratory several brands of cement which have given results nearly alike in the regular tests. All tests for strength cover at least 28 days, but many long-time tests are being carried. Considerable attention has been given to the methods used in making the tests and it is believed that they are the most accurate that can be employed.

The proposed new test for determining the effect of coatings on sand grains is being tested and given a thorough study. This test, if proven efficient, should give information in the testing of sands that will be of great value.

The testing of sand includes also the testing and examination of the gravel in the sand and also the testing of substitutes for sand and gravel, such as screenings, iron-ore tailings and slag.

CONCRETE TESTS

When in July, 1912, a hydraulic compression machine with a capacity of 200,000 pounds was placed in the laboratory, the

Division Engineers were notified that engineers in charge of work could take advantage of this machine and from time to time make cubes of concrete as it was being placed in the work. Six-inch cubes or cylinders of eight inches diameter and sixteen inches long can be tested in this machine. The plan generally followed is to mold the test piece from concrete mixed by the contractor for actual use in the work, keep it covered with a moist canvas for seven days, then allow it to be exposed under regular atmospheric conditions until the test-piece is twenty-one days old, when it is crated and sent to the laboratory for tests. The tests are made on these sample blocks when twenty-eight days old. The blocks are made in duplicate at least. In accordance with the newer practice, laboratory concrete specimens are being molded in cylinders, the length of which is twice the diameter. The cylinders generally give more uniform results than do the cubes.

OTHER TESTS

Besides those already reported, there have been made a large variety of other tests and analyses. Among the materials thus examined were stone, wooden and granite paving blocks, paving brick, bituminous materials, metal lath, hollow-tile, galvanized metal materials, waterproofings of various types, dynamo oils, wood preservatives, putty and paints. On these latter considerable work has been done. Another material submitted for testing has been linoleum and these tests have been both interesting and profitable. Considerable research work has been continued on laitance and on the efflorescence and incrustations on concrete, and microscopic examinations and analyses in the laboratory on these materials have been also continued. Additional apparatus has been installed to care for the above variety of work.

In addition to directing the work of the laboratory and mill inspection, the undersigned has made field inspection of the concrete and concrete materials being used on many of the Barge canal contracts where concrete was being placed. Particular attention has been given to the source of supply of the gravels, sand and stone being used in the concrete. A more definite knowledge is thus gained than is possible through a laboratory sample alone, but with both tests and field inspection absolute knowledge is gained. Inspec-

tion of its actual use is also a help in considering the points of merit or demerit in the material. Inspections of concrete that has been in place for some time have been made, to study the condition and the wear of the concrete for the purpose of securing information on the various theories that have been advanced from time to time on the changes that may take place in concrete. Some interesting and profitable studies have thus been made.

The development of the specifications and methods of tests of materials of construction is a natural sequence of the knowledge secured in the analyses, tests and inspections, so this has frequently been a valuable feature we have been called upon to do.

Respectfully submitted,

RUSSELL S. GREENMAN,
Senior Assistant Engineer in charge of Tests.

REPORT OF THE LAND BUREAU

STATE OF NEW YORK
DEPARTMENT OF THE STATE ENGINEER AND SURVEYOR
LAND BUREAU

ALBANY, N. Y., *July 1, 1918.*

HON. FRANK M. WILLIAMS, *State Engineer and Surveyor:*

Sir.—Herewith I submit a report of the work of the Land Bureau for the fiscal year ended June 30, 1918.

The sale of State land that is ordered sold by the Commissioners of the Land Office is conducted by this bureau. Twenty public auctions were held and the sum of \$10,000.50 realized therefrom. A detailed statement of the sales is appended. The average sale for the previous ten years is \$11,859.00. The above is exclusive of the sale of abandoned canal lands sold pursuant to chapter 299 of the Laws of 1916. The first sale of land under this act was held in the city of Schenectady on May 29, 1918, and 28 parcels were sold for \$133,415.00. The part desired by the city of Schenectady through the business section was not handled by this Department.

Maps of all grants of land under water made by the Commissioners of the Land Office and the Legislature are on file in this bureau and new grants are added when made by the Land Board. These maps are complete to June 1, 1918.

The early records, maps and field notes filed in this bureau are being constantly examined by the public and are of great and increasing value.

Respectfully submitted,

MERRITT PECKHAM, JR.

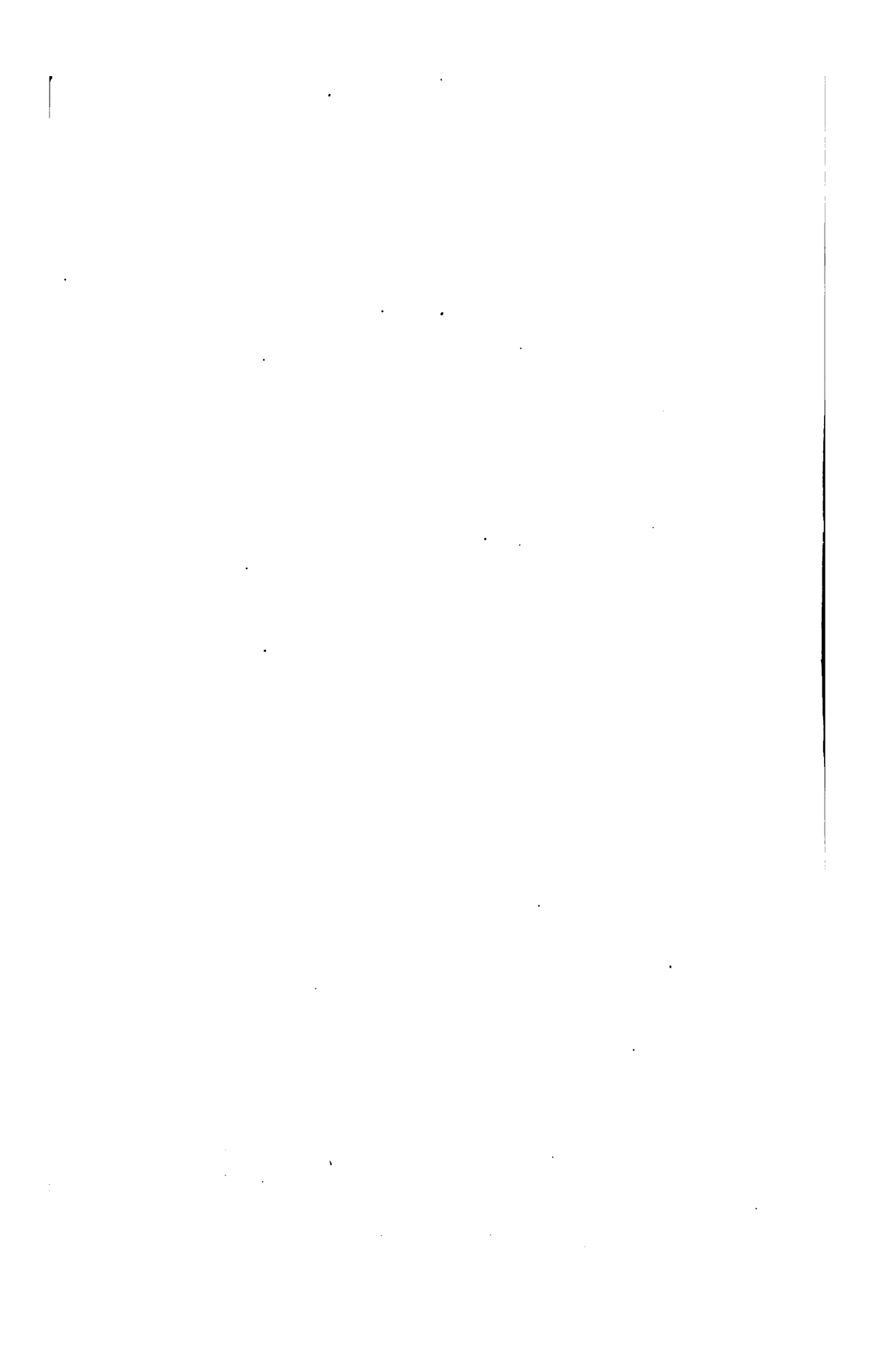
Land Clerk.

TABLE OF SALES CONDUCTED BY THE LAND BUREAU DURING THE FISCAL YEAR ENDED JUNE 30, 1918

Date of sale	PURCHASER	Location — county	Lot	Acres	Tax or mortgage	Price
1917						
July 24	August Nusser and wife.	Richmond	1 village lot.	.....	Tax.....	\$111 00
Aug. 14	Charles W. Pratt.	Oneida	.....	68	Mortgage.....	1,050 00
Aug. 22	John Seally.	Nassau	.....	5	Eachest.....	201 00
Oct. 7	F. H. Flaherty and two.	Onondaga	1 city lot.	.....	.....	471 00
Oct. 16	Heenan D. Merriam.	Oswego	1 village lot.	.....	Canal.....	154 50
Nov. 7	Middle Lehigh Co.	Kings	1 city lot.	.....	Tax.....	345 00
Nov. 8	Isabella Pender.	Kings	1 city lot.	.....	Tax.....	201 00
Dec. 18	Morris Mandel.	Rockland	4 village lots.	.....	Tax.....	179 00
1918						
Jan. 8	John and Teresa Grumino	Richmond	2 village lots.	.....	Tax.....	200 00
Jan. 16	Celia Pfeiffer.	Kings	18 city lots.	.....	Tax.....	2,651 00
Jan. 17	Richard Johnson.	Richmond	1 village lot.	.....	Tax.....	26 00
Jan. 23	Myron Johnson Co.	Chenango	.....	185	Tax and mortgage.....	900 00
Jan. 30	John W. Daly.	Kings	1 village lot.	.....	Tax.....	31 00
Feb. 12	Sarah I. Bailey.	Suffolk	1 village lot.	.....	Eachest.....	179 00
Feb. 19	N. Y. Consolidated R. R. Co.	Kings	1 city lot.	.....	Tax.....	764 00
Feb. 28	Worcester and Prentiss.	Herkimer	.....	84	Mortgage.....	1,400 00
Feb. 28	William Ball.	Oswego	.....	77½	Mortgage.....	438 00
Mar. 25	Benjamin Traktman.	Kings	2 city lots.	.....	Eachest.....	190 00
Mar. 27	M. Prouse Neal.	Oswego	2 city lots.	.....	.....	421 00
April 25						
	Total.					\$10,000 50

BOUNDARY LINE REPORT

**Relocation of Monuments on the Schoharie-Greene,
Greene-Delaware and Delaware-Schoharie
County Lines near Schoharie Creek**



**Report on Relocation of Monuments on the Schoharie-
Greene, Greene-Delaware and Delaware-
Schoharie County Boundary Lines
Near Schoharie Creek**

STATE OF NEW YORK
DEPARTMENT OF STATE ENGINEER AND SURVEYOR
EASTERN DIVISION

ALBANY, *December 27, 1918.*

HON. FRANK M. WILLIAMS, *State Engineer and Surveyor, Albany,
N. Y.:*

Dear Sir.—In 1914 a survey was made under chapter 760, Laws of 1913, of a portion of the boundary line between the counties of Greene and Schoharie by this Department.

The extreme westerly point of this boundary line is in Schoharie creek, about $11\frac{1}{8}$ miles north of Devasego Falls, and there meet the boundary line between the counties of Greene and Delaware and that between the counties of Schoharie and Delaware. To safely monument this point, three monuments were placed, and were noted in the report of the survey (Report of State Engineer and Surveyor for 1914, Vol. I) as monuments A, B and I.

The Board of Water Supply, City of New York, has since acquired the land on which these monuments were placed, and is now in the process of constructing a reservoir which will cover these monuments to a considerable depth. The Board of Water Supply offered and agreed to relocate these three monuments and to place them at points above the proposed flow line of the reservoir. This offer was accepted by this Department and an inspection was made of the proposed new locations. These locations being satisfactory to this Department, the Board of Water Supply relocated said monuments A, B and I as agreed and as reported by them, and recorded on the accompanying map.

Monument A is now located 455.65 feet westerly from its former location and on a prolongation of the line between monu-

ments A and B as originally established. It is on the "Taking line" and on the west side of a proposed new highway.

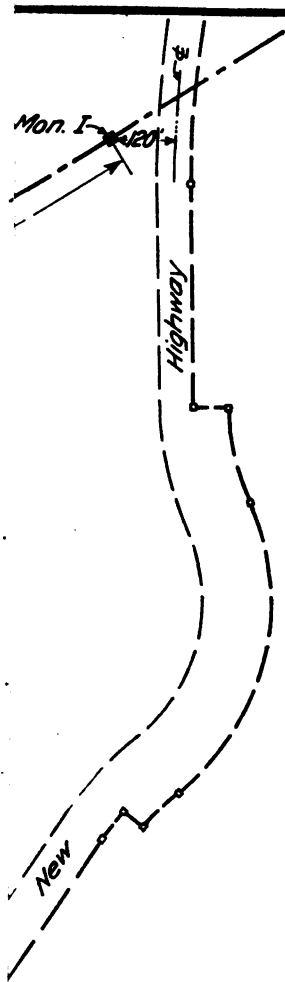
Monument B is now located 1,962.00 feet easterly from its former location and on a prolongation of the line between monuments A and B as originally established. It is on the "Taking line" and on the east side of a proposed new highway.

Monument I is now located 2,765.11 feet northeasterly from its former location and on the line between the counties of Greene and Schoharie. It is west 120 feet from the center line of the proposed new highway.

To aid in locating in the field the line between the counties of Greene and Schoharie, the Board of Water Supply located in addition a point on a prolongation of this county line into Delaware county and marked it by placing a bronze plug in ledge rock. This is also shown on the accompanying map.

Respectfully submitted,

RUSSELL S. GREENMAN,
Senior Assistant Engineer.



**PEENE-SCHOHARIE COUNTY
BOUNDARY LINE**

*SHOWING NEW LOCATION OF THREE MONUMENTS
ADDENDA to map in 1914 report*



BOARD OF WATER SUPPLY

CITY OF NEW YORK
ENGINEERING BUREAU

GRAND GORGE, N. Y., *December 23, 1918.*

HON. FRANK M. WILLIAMS, *State Engineer and Surveyor, Albany,*
N. Y.:

Dear Sir.— In accordance with an understanding reached with Senior Assistant Engineer Russel S. Greenman, the Greene-Delaware-Schoharie county line monuments have been relocated as shown on Acc. R-S-P-81, two blue-prints of which are forwarded herewith.

In addition to relocating the monuments, we have made a prolongation of the Schoharie-Greene county line and set a bronze plug in ledge rock, in order that from the new location of monument there should be a sight by which the county line could be produced in a northeasterly direction, the points being intervisible.

Trusting that this information will be satisfactory to you, I am,

Very truly yours,

GEO. G. HONNESS,
Department Engineer.

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